Products finishing

CLEANING
PLATING
POLISHING
FINISHING

OCTOBER • • 1943

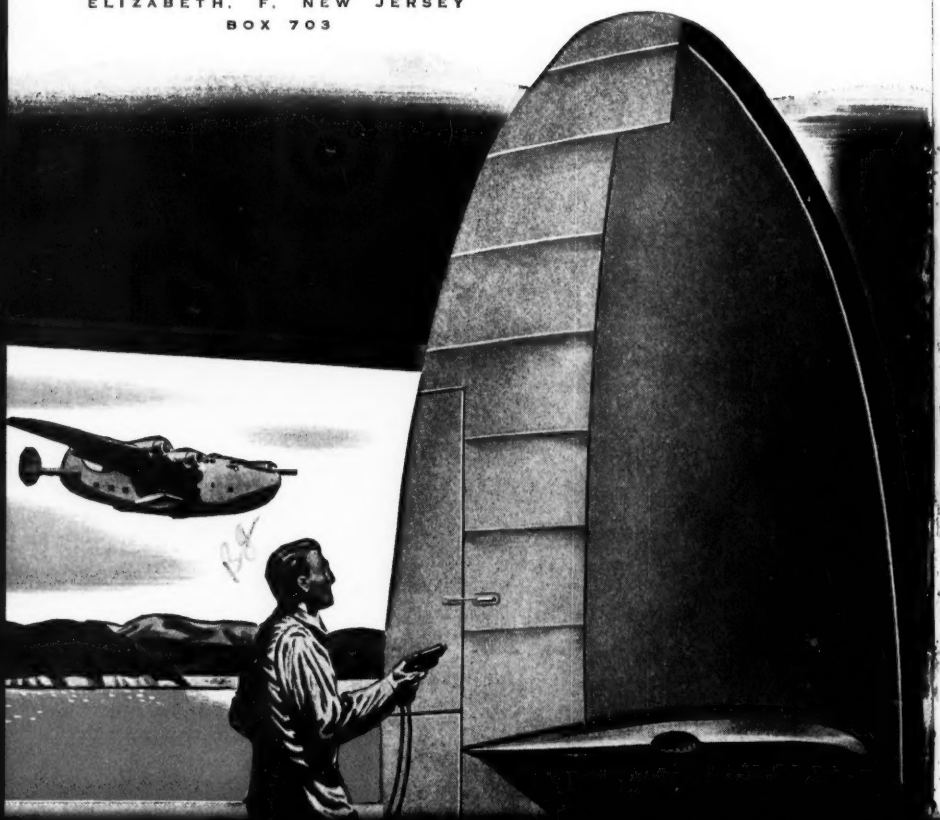
Fabric Finishing Time cut 33⅓%

at PAN AMERICAN

PAN-AMERICAN World Airways' Clipper ships have, during the past year, carried more urgently needed cargo to the fighting fronts through the utilization of the time-saving qualities offered by EMYCEL,* a speed finishing system for aircraft fabric surfaces, because: • 4 or 5 coats of EMYCEL Dope do the work of 7 to 11 conventional coats. • Blushing difficulties encountered during inclement weather are eliminated. • All coats are sprayed, costly, time-consuming hand brushing is eliminated. • EMYCEL protects against mildew rot, it insures greater safety and extends the time between overhauls. The production advantages offered by EMYCEL warrant your consideration, both for current and post-war transport operations. Write for complete details.

**EMYCEL, an all-spray doping system applied at elevated temperatures, is CAA approved.*

ROXALIN *Flexible* FINISHES
INCORPORATED
ELIZABETH, F. NEW JERSEY
BOX 703



Products finishing

DON G. GARDNER
President and General Manager

ECA
Member

FRED W. VOGEL, Editor
(On leave in U. S. Armed Forces)

Volume 8 | October, 1943 | Number 1

CONTENTS

Infra-Red on the Beam 14
By PAUL H. KRUPP

The Chemistry of Electroplating, Part 1 26
By DR. C. B. F. YOUNG

A Good Mix-Up Puts a Smile on Your Finish 46
By JEFFREY R. STEWART

Metcolized Coatings Save Critical Materials 56
By H. S. PICKARD

News of the Industry 64

New Equipment and Materials 70

The Finishing Touch 84
By J. A. PATTERSON

Catalog Library 86

Index to Advertisements 88

JESSE R. HARLAN
Production Manager
ELOISE STEWART
Asst. Production Manager

BRYANT W. POCOCK
JEFFREY R. STEWART
H. LEROY BEAVER
Consulting Editors

C. B. F. YOUNG
Contributing Editor

JOHN M. KRINGS
Advertising Manager

RICHARD S. KLINE
Southwestern Manager
431 Main St., Cincinnati (2)
MAin 0182

G. M. FILLMORE
Eastern Manager
342 Madison Ave., New York (17)
Murray Hill 6-3899

CHARLES H. DEILY, JR.
District Manager
310 West Durham St.
Philadelphia (19)
Chestnut Hill 1198

GEORGE H. MEYERS
Western Manager
Tribune Tower, Chicago (11)
Superior 2290

Published monthly by GARDNER PUBLICATIONS, Inc., 431 Main St., Cincinnati (2), Ohio
Printed in U. S. A. Copyright 1943 by Gardner Publications, Inc.
MORE THAN 16,000 CIRCULATION THIS ISSUE

Cowles AP CLEANER

The Fast—Dependable—Wartime

PLATERS' CLEANER

WITH direct or reverse current, or without electric current, Cowles AP Cleaner does exceptional time-saving work.

No fuming, no rejects, speed without reducing quality.

Inexperienced workmen get results with Cowles AP Cleaner. A trial drum will prove it. Prompt Shipment—
—Technical Service on Request.

THE COWLES DETERGENT CO.

Metal Cleaning Dept.

7016 Euclid Ave. ★ **Cleveland, Ohio**

Products Finishing 3-28-45

PRODUCTS finishing

COMES now an important War Conference Display which is sponsored by the 25th National Metal Congress. As a base for operations, Chicago's Palmer House, on October 18th through 22nd, 1943, will house members, conferences and displays, alike. The hotel has set aside 278 rooms to be used exclusively for this purpose. Participating manufacturers will find it convenient and easily accessible to the Metal Men who attend technical sessions to be held in central meeting places within the hotel. Likewise the members and their guests can readily visit all display rooms where production and other problems may be discussed with technical staffs of the manufacturers.

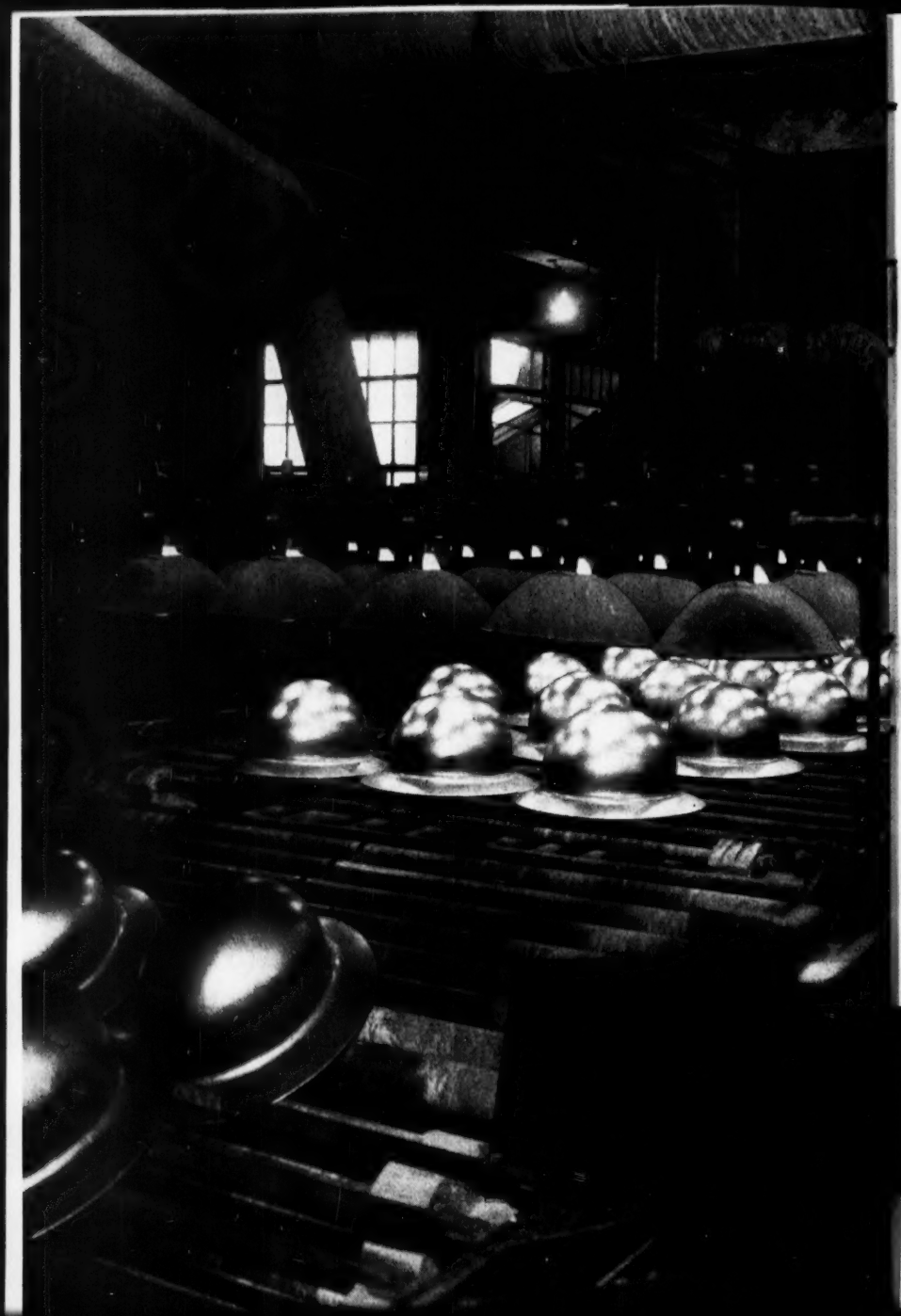
Four participating societies, including the American Society for Metals — the American Welding Society—the Wire Association, and the Institute of Metals and Iron and Steel Divisions of the American Institute of Mining and Metallurgical Engineers have cooperated in promoting this important meeting.

"Increased Production of War Products, Conservation of Materials and Post War Planning" will be the theme of the Congress and it is expected that ideas, methods and materials for the prosecution of the war will dominate throughout. Speakers from all of the national societies will feature the five day-and-night technical programs and will cover developments which should be of vital interest to industrial technicians.

Displays will represent new designs and developments in metal-working equipment and materials—new metals, heat treating equipment, cleaning and finishing materials and equipment, tools and machines, and so on. This meeting will afford manufacturers an opportunity to meet with key men in the metal industry from the United States and Canada and to discuss problems of a technical nature.

As a whole, the Metal Congress promises to be "The Event of the Year in the Metal Industry."

OCTOBER, 1943 **Vol. 8, No. 1**



Quick and easily controlled heat speeds production of war equipment—from helmets to half-tracs.

By PAUL H. KRUPP

The Fostoria Pressed Steel Corporation

IT is not exaggeration to say that the near infra-red process has experienced spectacular growth since its inception for industrial use in 1939. Then, finish baking applications were considered the scope of the process. Now, with no intention to minimize the "first love," it is necessary to confess that drying, dehydrating, preheating and similar applications are getting their share of use and attention. In fact, any place where quick and easily controlled heat can be used, there is need for the process.

Born in a peace era, the near infra-red process actually had little chance to be applied very extensively to peacetime operations. Actual development and expansion on a wide scale has been accomplished during the present war era; however, it is quite likely that this condition will not stymie the carry-over to the post war period. In fact, some of the large installations have been engineered and made on the premise that peacetime products could be processed as advantageously as present war materials. Examples of this broad utility are Willys-Overland with a total connected load of over 700 KW's of near infra-red equipment, and White Motor Company with a total connected load of approximately 1,000 KW.

Too often little thought is given the connection which the process has with all the various operations pertaining to finishing materials. Before the finish can be applied to parts prior to fabrication, there are cleaning, drying, polishing and multiple other operations where the near infra-red process can be applied.

Figure 1 (the illustration on the title page of this article) shows an installation in a mid-west plant where civilian defense helmets are dried after coming from the degreaser. Figure 2 shows the same helmets getting the finish baked in 3½ minutes.

One of the Pratt & Whitney aircraft plants recently installed a 66 KW job to reprocess felt emery wheels used in polishing airplane parts. This is an important operation and the maintenance cost for processing these polishing wheels runs into thousands of dollars annually. It is estimated that the near infra-red method will cut costs approximately in half. The felt wheels are brought directly from the polishing machines after maximum use and placed on a 16-foot conveyor to start the reprocessing operation, as shown in Fig. 3. Near infra-red equipment is mounted above and below the conveyor belt.

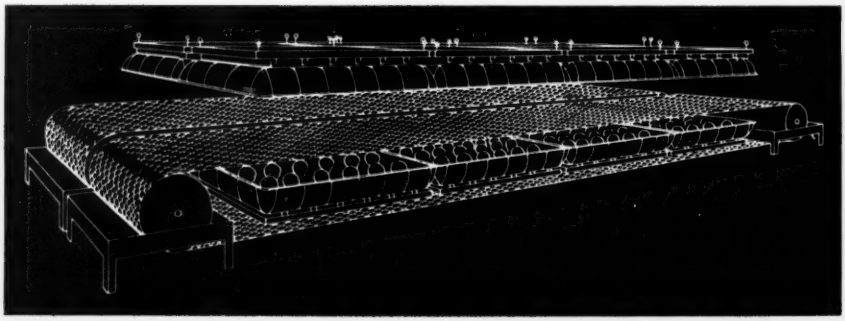
The initial pass through the length of the first conveyor is for the purpose of thoroughly dehydrating all moisture and oil from the wheel. At

Fig. 2—Civilian defense helmets are finished baked in 3½ minutes in this near infra-red tunnel.

the end of the first conveyor a coat of sizing is applied and the wheel placed on the second conveyor which moves in the opposite direction. At the end of the second conveyor, the wheel is taken off and a coating of emery is applied and it is again placed on the starting end of the first conveyor. At the end of the first conveyor another coat of emery is applied and this final coating is dried on the second conveyor. Arriving at the starting point, the wheels are removed and put back into service.

Each pass through this process requires 10 minutes, or a total of 40

Fig. 3—Diagram of 16-foot conveyor on which felt emery polishing wheels are reprocessed.



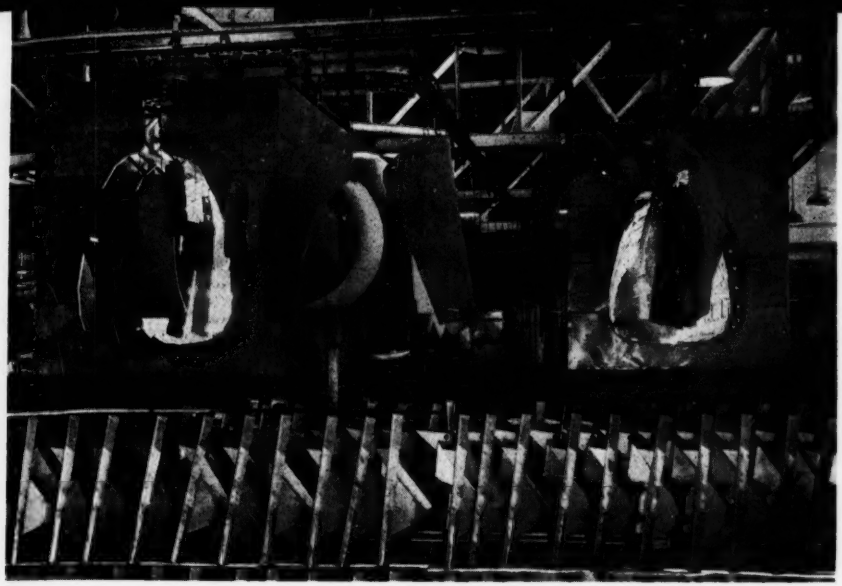
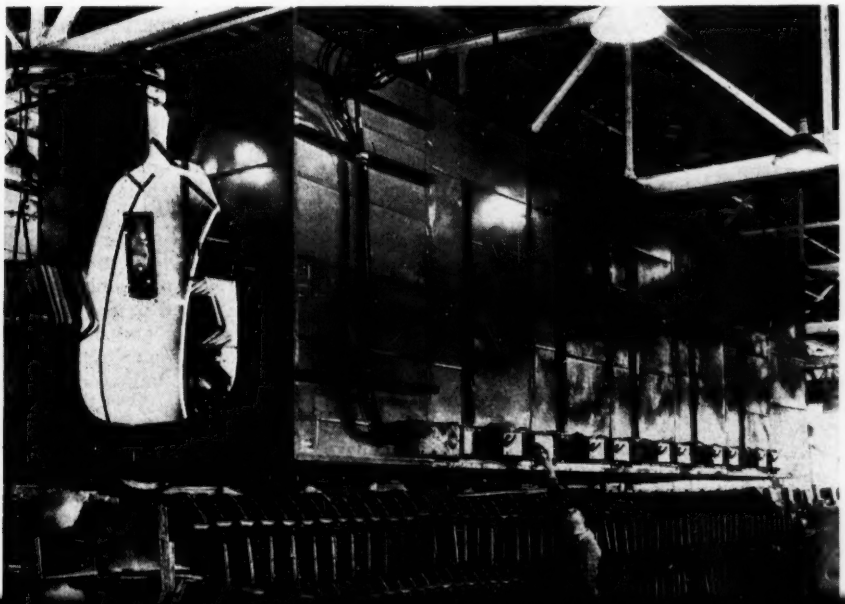


Fig. 4—Overhead mounting of infra-red tunnels at White Motor Company permits utilization of floor space for stacking materials prior to finishing.

minutes to recondition the wheels. The former method of drying required 24 hours. Pratt & Whitney have been able to reduce their stock of wheels and produce a superior wheel for polishing operations since adopting this

Fig. 5—Control equipment which starts or stops baking with a flip of the switch is illustrated here.



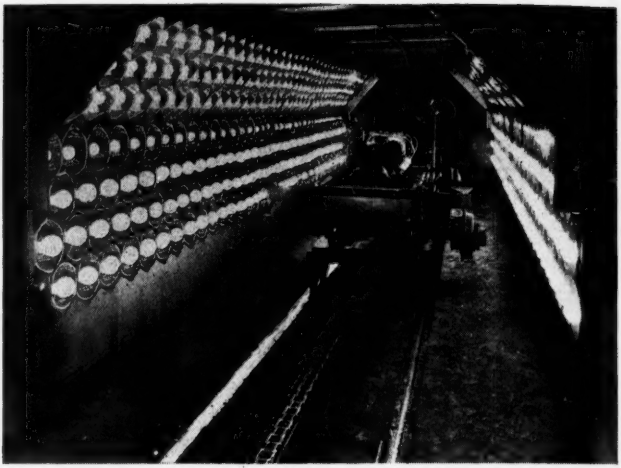


Fig. 6—A chassis oven at White in which prime finish and finish are baked quickly and efficiently.

method. The life of wheels has also been increased. Wheels vary in size from ½ inch to 12 inches in diameter in many different shapes and thicknesses. The equipment is also used to dehydrate the emery dust before applying it to the wheels.

The White Motor Company installations referred to earlier in this article is used for a variety of finish baking operations and offers a splendid example of the space-saving feature of near infra-red equipment. Ten separate tunnels are in operation in the plant, with five of them suspended from the ceiling. The overhead mounting permits utilization of floor space for the stacking of materials prior to finishing, as can be seen in Fig. 4. The same figure shows a variety of prefabricated parts for commercial trucks, half-tracs, tank destroyers, scout cars, and so on, getting both the prime and finish coats baked. The tunnel on the left bakes the prime coat in eight minutes; previous baking time with a different method was 55 minutes. Without being removed from the conveyor, the part gets a finish spray coat and is then baked in the tunnel on the right in approximately 12 minutes—previous baking time, 55 minutes. Red oxide primers, finish gray, olive drab and bright red are all baked equally as well. Wrinkle finishes are also baked on some parts.

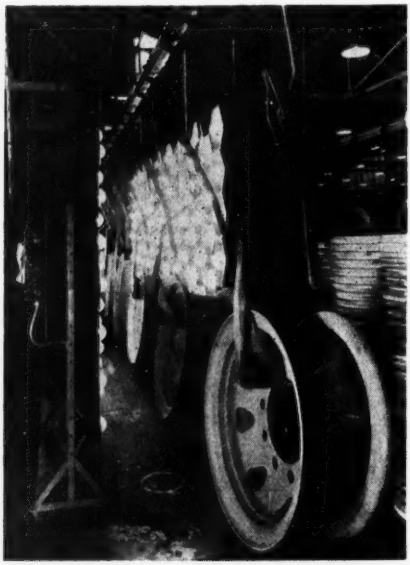
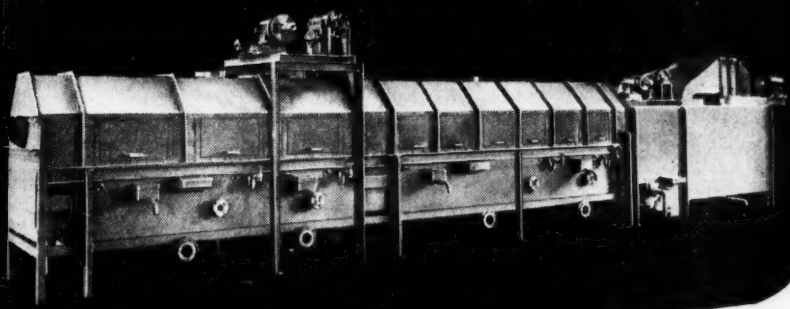


Fig. 7—Wheels are baked in four minutes in this tunnel, as compared with a previous air-drying period of 30 minutes.

Figures 5, 6 and 7 show various views of some of the other White Motor Company tunnels with materials being processed. Figure 5 shows the ease of control with the near infra-

DO YOU STILL HAVE "PICKLING BUGS"?



IF *YOUR* pickling operation is not as efficient as you believe it should be, why not follow the lead of other famous companies and let us help you?

SHOWN above is one of the many complete pickling, rinsing, cuprodining, neutralizing, soap-coating and drying machines we have designed, engineered and built for handling 50 calibre steel cartridge cases after the drawing operation. This rotary drum-type machine is completely automatic, even to temperature controls. Speedy, it handles 6000 lbs. of material an hour.

Write for more details, new folder picturing and describing other A-F Cleaning and Finishing Equipment or for a discussion of your metal products cleaning, finishing and handling problems —today.

ARMY NAVY

THE ALVEY-FERGUSON COMPANY, 632 Disney Street, Cincinnati 9, Ohio

AFFILIATED CORPORATION, THE ALVEY-FERGUSON CO. OF CALIFORNIA SLAUSON AND SANTA FE AVENUES, LOS ANGELES, CALIFORNIA

CONVEYING A-F MACHINERY

Alvey-Ferguson

red process—there is no standby loss of energy. Baking starts and stops with a flip of the switch. A view of one of the chassis ovens can be seen in Fig. 6. Prime finish is baked in 4¼ minutes and finish in 5 minutes as compared to 30 minutes each by air drying previously. Figure 7 shows wheels being baked in four minutes

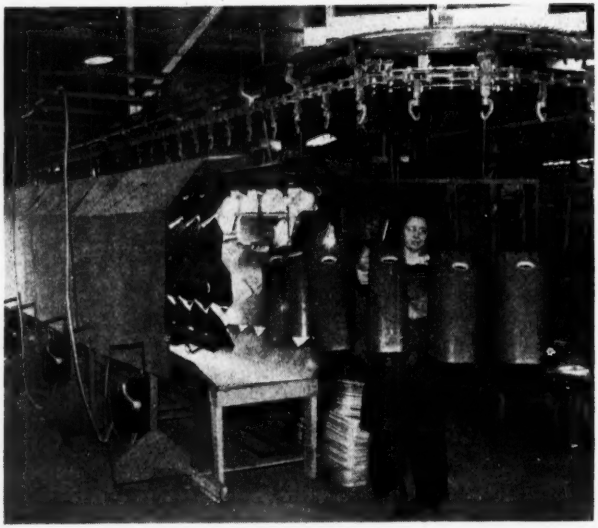


Fig. 8—An inside and outside finish is baked on expeditionary cans in this infra-red installation which has a total connected load of 84 KW.

as compared to 30 minutes for air drying previously.

An installation with a total connected load of 84 KW's is being used at Conco Engineering Company to bake an inside and outside finish on expeditionary cans. Constructed of 20-gauge metal, the cans are used by the armed forces for gasoline, oil and water. After coming from the degreaser on a flat conveyor, the cans are sprayed on the inside with a Bakelite base paint, as well as the prime coat on the outside of the cans. As can be seen in the illustration Fig. 8, the cans then travel through the first baking zone suspended from an overhead conveyor. Baking time for this operation is four minutes.

The cans are then tested for leaks and returned to the conveyor line where the finish coat of olive drab is applied by the spray method. This last baking operation, handled in a second infra-red tunnel, requires only 2½ minutes. Previous baking methods required 45 minutes.

To better prepare American bombardiers for the job of making direct hits on Tojo, Hitler and associates, practice bombs are used during training periods. A mid-western industrial plant, one of the many that manufacture these bombs, gets assistance in the finishing operations from the near infra-red process. Figure 9 shows one of the 100-lb. bombs entering the tunnel for the 4¾-minute bake required. The first sections of each side of the tunnel are lamped with 375-watt lamps to provide an extra boost to the finish baking. The rest of the tunnel uses 250-watt lamps.

As was stated earlier in this article, all the uses for near infra-red are not confined to finish baking operations. Another mid-west industrial firm finds the process advantageous for drying and preheating of 20 mm. projectiles during finish operations.

After the machining and polishing operations are completed, the projectiles are degreased and coated with oil. They are then placed in wire mesh trays, nose up, in a stationary infra-red tunnel. As can be seen from Fig. 10, infra-red reflectors are placed

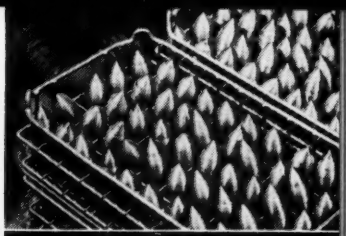
JUST OFF PRESS!

New facts on Metal Cleaning!

Whether you manufacture bombers or war parts, this informative literature can help you speed up metal cleaning in your plant.

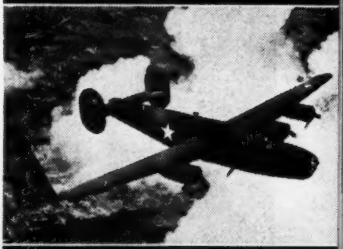
With convincing case histories, it shows you how Sun Spirits, the modern pure petroleum solvent, saves time, reduces costs, cleans quickly, safely, and thoroughly. Write today.

SUN OIL COMPANY • ***Philadelphia***



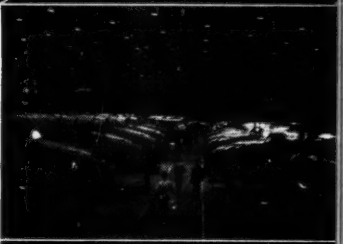
SHELLS SPEEDED!

Sun Spirits is cleaning thousands of brass shell primers easily and speedily, without discoloration.



PLANE PARTS FASTER!

Sun Spirits stepped up production for this manufacturer of aluminum bomber parts.



BOMBER COSTS CUT!

In another plant, Sun Spirits effected savings in cleaning costs exceeding 75%.

SUNOCO

SUN INDUSTRIAL PRODUCTS

HELPING INDUSTRY HELP AMERICA

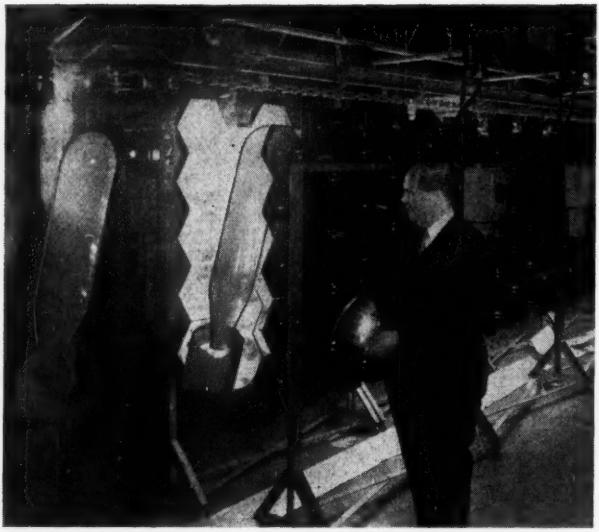


Fig. 9—Practice bombs of 100-lb. size used in training bombardiers are quickly baked in this near infra-red tunnel.

above and below the material to dry it thoroughly in 7½ minutes. The material is then inspected and again placed in the tunnel for 2½ minutes of preheating prior to another dipping in oil and final packing.

In addition to the various operations discussed above, near infra-red equipment is also being used for drying and preheating operations in the textile industry, the paper industry, plastics industry, and many others. Undoubtedly this wide utility can be given much credence for the growth of the process. However, five conservation features of the process have been particularly advantageous during these war days. They are conservation of time, space, manpower, energy and materials. Industry has been quick to note and appreciate these features, as evidenced by the rapid expansion and acceptance of the process.

War is Hell — but slavery would be worse. We can't all go to the front, but we can send our dollars to fight for us by buying Victory Bonds.

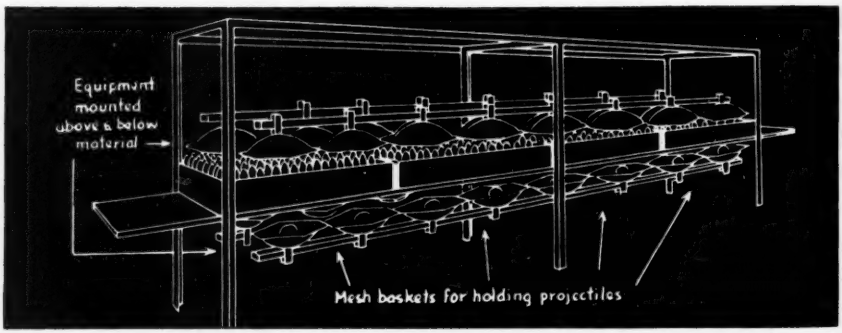


Fig. 10—Drying and preheating of 20 mm. projectiles during finishing operations takes place in the stationary infra-red tunnel shown here. Reflectors are placed above and below the material to speed up drying.

Kidde

The Chemistry of Electroplating

By Dr. C. B. F. Young, Consultant

Part 1.

THIS series of articles is designed to give the electroplater a fundamental knowledge of the theories underlying chemistry so that he may be able to apply the same theories in producing better work in the plant. It is impossible to design a course of study in which the student will have nothing to do except read lessons for a few times and the results will pour forth. It is absolutely essential that the student undertake the course as a very serious study.

These articles are a study of the fundamental laws of chemistry. In this study the student is introduced to the behavior of the elements. One may think that a study of chemistry for electroplaters is a waste of time, but such is not the case. The fundamental laws of chemistry are the foundation for electrochemistry and in order to cope with the many problems which arise one must be well grounded in the study of the elements. As an example, if one desires to analyze the nickel sulfate in a nickel plating solution it is essential that he obtain a standardized sodium cyanide solution. How are we to determine the method of standardization of this sodium cyanide? This and many other questions can be answered only by a scientific study of chemistry.

Chemistry is a study of the elements. Our universe is made up of only 92 elements. Wherever we go and whatever is seen, the material upon which our eyes fall can be subdivided into these building blocks of nature. For instance, water is made up of two elements, hydrogen and oxygen. Sulfuric acid is made up of three elements, namely, hydrogen, sulfur, and oxygen. It makes no difference whether one picks up wood, concrete, steel, cotton, or so forth, one can always break these substances down into their constituents which are the elements. Chemistry deals with the composition and changes in composition of substances. It is also concerned with their properties and their energy relations. In order to study chemistry from a scientific point of view it is necessary first to classify the elements according to their fields and learn the general properties of them. In this way a broad field can be covered in a rather limited time. In our study we are particularly interested in those elements which enter the field of electroplating and throughout this series of articles emphasis will be placed upon these elements. In other words, we shall study chemistry from the point of view of the electroplater.

When a chemical change occurs, what happens? All electroplaters are

familiar with the corrosion of metals. If this is analyzed it will be seen that it is due to the uniting of the metal with another element or compound. For instance, when iron is left in the open, it rusts. When iron rusts, it is transformed and is no longer iron. Therefore, we have a chemical change. Whenever a fire is built the coal which is burned is transformed into ashes and gases. Again a chemical change has taken place. In the electroplating shop chemical change takes place when a piece of metal is cleaned from rust or scale. The whole is dipped into an acid solution and the scale is dissolved. Here the scale changes from an insoluble material to one that is soluble. If silver is deposited from a silver strike solution using iron anodes, the silver cyanide is transformed to silver. This again is chemical change.

If a chemical change has taken place, one can rest assured that the original products have been transformed or changed into another product. Thus, if a match is lighted and burned the results are (1) smoke or gases liberated and (2) a black mass of carbon is left behind. These materials are quite different from the original phosphorous and wood. It can readily be seen that the final products are quite different from the original products. Again, if silver is deposited from a silver cyanide strike, we know the silver is quite different from the compound, silver cyanide. It can be said that in every chemical change one or more materials disappear and one or more substances are formed. As a general rule heat is given off or taken in and light is often produced in a chemical change.

How does the chemist recognize different materials? Compounds and elements have faces the same as humans. How do we tell our friends apart? One has brown hair, blue eyes and weighs 175 pounds, while another has black hair, brown eyes and weighs 145 pounds. There is no trouble in telling such people apart. In the same way the chemist can tell the difference between two compounds. For instance, iron rust is red brown and crumbles very easily. On the other hand, iron is a steel gray color and very hard. Any person can recognize these differences.

Aside from these characteristics which are known as physical characteristics, the chemist recognizes materials by their actions or properties. Thus, iron rusts and forms a red brown material while gold does not. For this reason steel and other materials are often covered with gold in order that they may be protected. In identifying materials one should never rely on one test alone. Many properties should be used to identify a substance.

If a chemical change has taken place, new materials have formed; that is, the materials produced will not have the same properties as the former substance had. Thus, iron rusts and forms, as has been pointed out, a red brown material which crumbles very easily. This material is quite different from iron because it has (1) a different color, (2) is lighter, (3) crumbles under pressure, (4) is not attracted to a magnet. Therefore, we can say that the original iron has disappeared and a new material has formed in its place. We recognize the change which has taken place by observing that the first material is quite different from the final product.

All matter must be accounted for. It is impossible to create or destroy matter. True, one may change the form of materials and render them impossible for use from the point of view of man, but they are never erased or destroyed in the chemical sense. Perhaps an explanation here would help. A piece of wood may be burned but no matter has been destroyed. The gases which are released plus the ashes are equal to the wood

plus the air which aided the burning. Therefore, a building which is burned is destroyed from the point of view of using it for storing purposes, but chemically speaking a chemical reaction has taken place and the wood has been transformed into another form. When a chemical experiment is performed the materials entering the reaction are always equal to the materials formed by the same reaction. This is the law of conservation of matter.

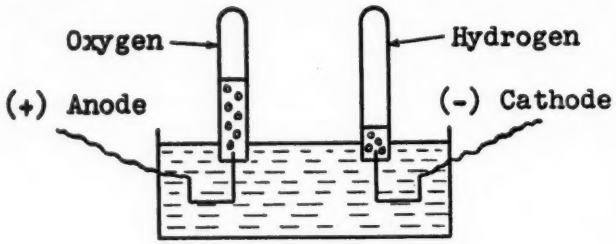


Fig. I

A material which contains all uniform parts is said to be homogeneous and is called a substance. A material which is composed of unlike parts is called a mixture. For instance, an example of the first would be common salt. If a sample of common salt is examined under the microscope we find that it contains a large number of small cubes. These cubes may vary in size but they all have the same color and same general structure. No matter how high we magnify these parts only one substance can be found, namely, salt.

On the other hand, if dirty salt is examined we can then find substances of at least two different types, namely, salt and materials which are not salt. With the aid of a microscope it is possible to see these particles and if tweezers are used one can separate the salt from the dirt, by merely picking out the salt crystals and leaving behind the dirt.

Another example of this would be a mixture of iron and sulfur. Iron in the finely divided state appears black while sulfur appears yellow. We can also separate this by using tweezers or by using a magnet which will attract the iron and not the sulfur, or we can separate by pouring carbon disulfide over the mixture. The carbon disulfide dissolves the sulfur and leaves behind the iron. On evaporating the carbon disulfide the yellow material of sulfur is obtained. A mixture contains two or more ingredients or compounds which retain their own properties, while a compound contains only one ingredient.

In the introduction the fact was mentioned that in our universe there are 92 elements. When these elements are united chemically and not merely mixed together chemical compounds are obtained. As has been pointed out, water is a chemical compound, being composed of two gases, hydrogen and oxygen. This can be proven by decomposing water by electrolyzing the solution. If an apparatus is set up as shown in Fig. I, and current passed through the water, it will be noticed that the water decomposes and on each electrode a gas is liberated. It will also be observed that the positive side or anode will contain one-half the amount of gas as the negative side or cathode. If a test for these gases is made, it will be found that the gas which was released at the positive side is oxygen, while the gas that is released at the negative side is hydrogen. From this experiment it can be seen that water has been broken up into its constituents, namely, hydrogen and oxygen.

If mercuric oxide is examined it is

GUNS ALONE WIN NO BATTLES

Vedoc

Without the *right* ammunition and plenty of "know-how", the best gun in the world is useless—in winning battles or solving tough finishing problems.

Fitting the finish to the job, and especially to the production setup, is one thing we do exceptionally well here at the Liquid Plastics Division of Ferro. First of all, we make *only* industrial finishes and war paints. Secondly, we concentrate on *quality*, not quantity . . . hence are able to devote much of our time to laboratory work and experimentation.

Let us help you on your next difficult finishing job.

LIQUID PLASTICS DIVISION
FERRO ENAMEL CORPORATION
CLEVELAND, OHIO

found to be a red powder. If further examined under a microscope it will be seen that the material is homogeneous, that is, every part is similar to the rest. Now if some of this material is placed in a test tube and heated it will be noted that the red powder becomes dark. If a glowing splint is introduced into the mouth of the test tube it at once bursts into flame. This indicates that oxygen is being liberated. On examining the tube closely which contains the red powder it will be noted that in the cooler or upper part of the tube little drops of mercury have collected. If the heating was carried out long enough all the red powder will have disappeared, liberating oxygen as a gas and mercury or quick silver as a liquid. From this experiment it can be seen that the red oxide of mercury is composed of two elements. These are mercury and oxygen. Any substance which can be decomposed into two or more other substances is called a chemical compound.

A fundamental knowledge of the theories underlying chemistry is assured the electroplater who gives close attention and careful study to this series of 12 articles prepared by Dr. C. B. F. Young, an authority in the electroplating world. This article is the first of the series, which will be published monthly—save your copies of P. F. so that you will have the complete series.

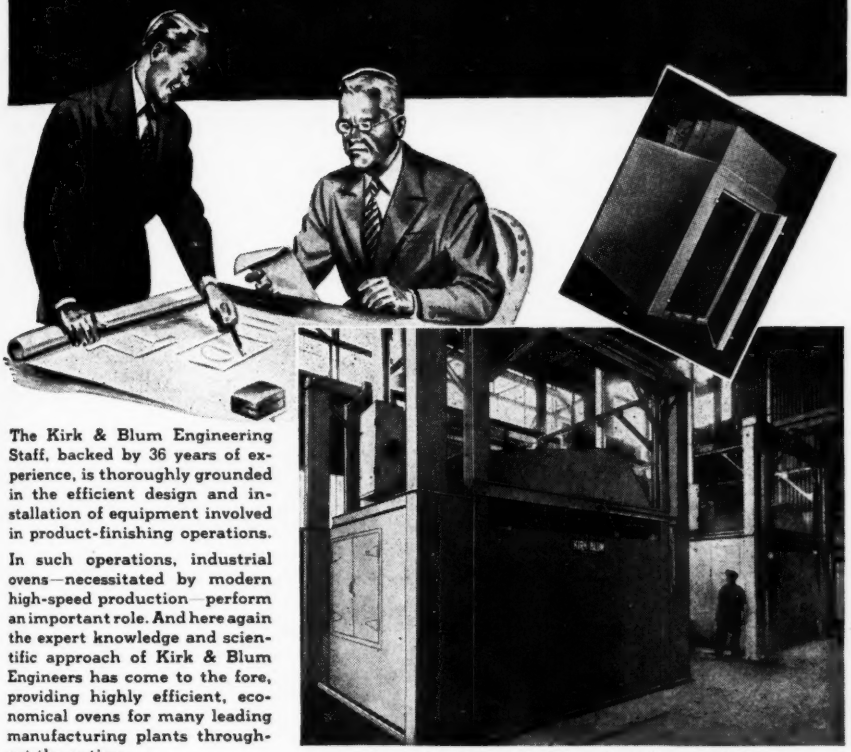
An element is a material which can not be decomposed into simple substances. One thing should be pointed out at this point and that is that if two materials or elements are in chemical combination, both lose their chemical faces or identity and assume new faces or properties. Thus, water is a colorless, odorless, tasteless liquid which freezes at 0 deg. C. and which will dissolve many materials. This compound, as we have said, is composed of two gases, hydrogen and oxygen. Hydrogen is a colorless, odorless, tasteless gas which is the lightest material in the world and oxygen is a colorless, odorless, tasteless gas, sixteen times heavier than hydrogen. There is no similarity whatever between water, hydrogen, or oxygen. The same is true of mercuric oxide. This material is composed of two elements, mercury and oxygen. Mercury is a silver colored liquid metal, while oxygen is a gas which has just been described. These two elements combine to give a compound which is a red powder. Elements form compounds.

A few paragraphs above the breaking down of two compounds and obtaining their constituent elements was discussed. Now we shall reverse this process by taking two elements and making a compound. If a small amount of sulfur is placed in a mortar or grinding dish and then some mercury or quick silver is introduced, and the two elements are ground together it will be found that after stirring a few moments the sulfur loses its beautiful yellow color and begins assuming a dark gray to black color. At the same time it will be observed also that the mercury or quick silver disappears. On further investigation it will be noted that a new compound which is quite unlike the mercury or the sulfur has been formed. This compound is mercuric sulfide which is a black powder, wholly different from either the mercury or the sulfur. Again the properties of mercuric sulfide are very different from the properties of mercury or sulfur. It has a group of properties unknown to other compounds or elements.

The chemist desires many times to indicate a chemical change. He would like to put this in a very condensed form. For instance, we can represent the change of the red lead mercury or oxygen by merely writing—

Mercuric Oxide = Mercury + Oxygen.
(108) (100) (8)

Efficient Industrial Ovens



The Kirk & Blum Engineering Staff, backed by 36 years of experience, is thoroughly grounded in the efficient design and installation of equipment involved in product-finishing operations.

In such operations, industrial ovens—necessitated by modern high-speed production—perform an important role. And here again the expert knowledge and scientific approach of Kirk & Blum Engineers has come to the fore, providing highly efficient, economical ovens for many leading manufacturing plants throughout the nation.

Top illustration—Steam heated, re-circulating type baking oven.
Bottom illustration—Direct gas fired oven for core and mold drying.

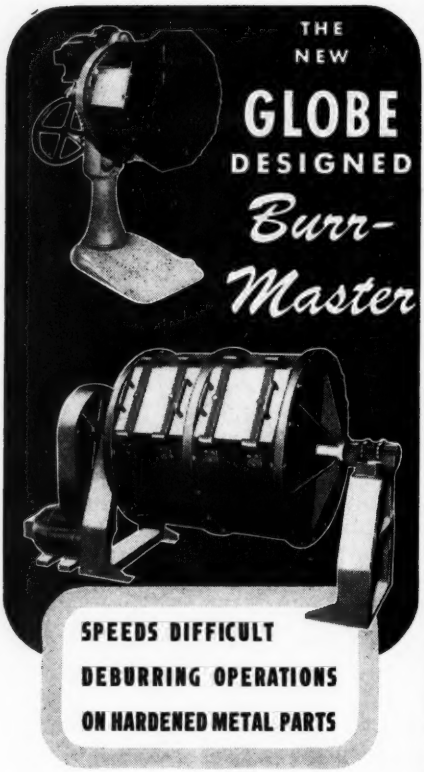
Our engineers plan, design, and erect complete oven installations of any type—continuous conveyor drying and baking ovens, core baking ovens, etc. These systems are guaranteed by Kirk & Blum to speed production . . . reduce fuel and labor costs . . . save floor space . . . promote maximum safety.

Don't take chances with a "hit-or-miss" oven installation. Get the unbiased counsel and scientific planning of experts—Kirk & Blum Engineers. Write to The Kirk & Blum Manufacturing Co., 2816 Spring Grove Ave., Cincinnati, Ohio, for Booklet "Industrial Ovens."

KIRK AND BLUM

AN ORGANIZATION OF ENGINEERS AND MECHANICS

We've Done Our Bit . . . Now Let's Do Our Best! BUY MORE WAR BONDS



● The new Burr-Master Tumbling Barrels were originated by Globe to provide a more rapid means of cleaning and deburring today's tougher metal parts. The Burr-Master comes in two sizes. The Standard (top illustration) and the Senior (below). The Standard is equipped with a low speed, gearhead motor and is the tilting type for easy loading and unloading. The Senior is a double compartment, horizontal type with water-tight shells. The Senior is recommended where large quantities of parts are to be deburred. Write for new Burr-Master literature today.

★ *See the new Burr-Master in operation at the National Metal Congress Room 719, Palmer House*

THE Globe MACHINE AND STAMPING CO. CLEVELAND 2, OHIO

It will be noted that under mercuric oxide appears the number (108), under mercury appears (100), and under oxygen appears (8). These are the molecular weights and atomic weights respectively, of a compound and the two elements. This will be explained further in a chapter later on. It will be noted that these numbers indicate the properties by weight. Therefore, 108 parts of mercuric oxide produces 100 parts of mercury and 8 parts of oxygen. If the mercuric oxide for the experiment is obtained from South America, France, Germany, Spain, Africa, or India, it will always be found that on decomposing the mercuric oxide $\frac{100}{108}$ or 92.6 per cent of the weight used results in mercury and $\frac{8}{108}$ or 7.4 per cent of the weight gives oxygen. This compound always decomposes in this ratio.

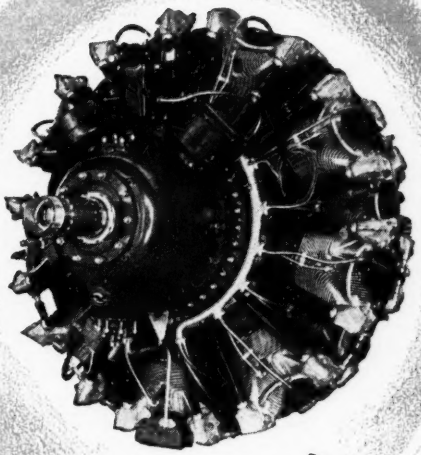
The union of iron and sulfur giving iron sulfide may be represented as

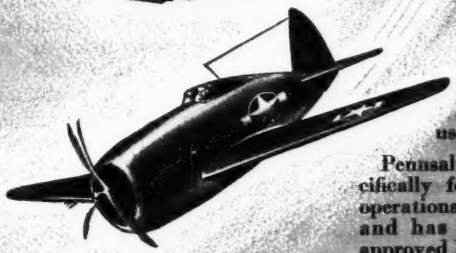
$$\underset{(55.84)}{\text{Iron}} + \underset{(32)}{\text{Sulfur}} = \underset{(87.84)}{\text{Iron Sulfide.}}$$

From this it can be seen that 55.84 parts of iron unite with 32 parts of sulfur to give 87.84 parts of iron sulfide. Now the composition of iron sulfide is $\frac{55.84}{87.84}$ or 63.6 per cent iron and $\frac{32}{87.84}$ or 36.4 per cent sulfur. It will be noted that if the per cent of iron plus the per cent of sulfur, namely, 63.6 plus 36.4, are added together, the result is 100 per cent, which means that iron sulfide is composed only of iron and sulfur in this ratio and nothing else. This and many other compounds have been checked by quantitative analysis and each time the prediction has come true regardless of where the compound or elements come from. Therefore, we may conclude

PRATT & WHITNEY AIRCRAFT
cleans engine parts
with PENNSALT CLEANER K-7

Reg. U. S. Pat. Off.





in the Bullard-Dunn Process

An important metal cleaning job in this plant is the removal of scale and oil from Pratt & Whitney aircraft engine parts. Pennsalt Cleaner K-7 was demonstrated in the Bullard-Dunn Process with highly satisfactory results, at a concentration of only 10 ounces per gallon.

Here are the outstanding advantages of this Pennsalt Cleaner: It does *not* leave a film . . . Both cleaning and defilming are done in minimum time, in the same tank . . . Pennsalt K-7 is easy to handle . . . It does not fume . . . It can be used at low concentrations . . . And it is suitable for use in hard water areas.

Pennsalt Cleaner K-7 was designed specifically for the cleaning and defilming operations in the Bullard-Dunn Process and has been thoroughly tested and approved by The Bullard Company.

Pennsalt Cleaner K-7 is one of a complete line of Pennsalt Cleaners available for all types of metal cleaning. If you have a wartime metal cleaning job, by all means make use of the wide experience of our technicians. No obligations. Simply write fully about your problem to our Pennsalt Cleaner Division, Dept. PF.

PENNSYLVANIA SALT
MANUFACTURING COMPANY
Chemicals

1000 WIDENER BUILDING, PHILADELPHIA 7, PA.
New York • Chicago • St. Louis • Pittsburgh • Minneapolis
Wyandotte • Tacoma

that every pure compound has a definite composition by weight. This is known as the law of definite composition.

The big difference between a mixture and a compound lies in the fact that a compound is homogeneous, or the same throughout and a mixture is heterogeneous, or different throughout. If a substance can be separated by mechanical means it is a mixture. For instance, sand and salt can be separated by using tweezers to pick the small crystals of sand and leaving behind the crystals of salt. This would be a trying undertaking but it could be accomplished if necessary, while on the other hand it would be impossible to separate water into its components by mechanical means. In this manner we can generally distinguish between a compound and a mixture.

A mixture can often be separated because the materials which make up the mixture retain their common faces or properties. For instance, if salt and sand are mixed the salt has not lost any of its properties, neither has the sand. It is common knowledge that sand is insoluble in water, while salt will dissolve very readily in this liquid. Therefore, if this mixture is put into some water and agitated it will be found that the salt dissolves, leaving behind the sand. If the water is poured off we will have left behind the sand. Now if the water is evaporated the salt will be recovered. Thus by an ordinary mechanical operation it is possible to separate the salt from the sand. A similar illustration was used earlier. In this instance sulfur was dissolved by carbon disulfide and then recovered as above.

Although there are 92 elements, only 25 of these are common. If the earth's crust is analyzed it will be seen that oxygen is the most abundant element, with silicon next, and then aluminum which is followed by iron, and so on. Contrary to common belief there is more aluminum than iron. One would think from this that aluminum and its alloys would be more prevalent than iron. The reason aluminum has not been used more is on account of the cost of obtaining the same. We shall learn more about this interesting element later on.

The elements are divided into two classes, namely, metals and nonmetals. Thus iron, aluminum, copper, gold, silver, and so on, are good examples of the first group. The electroplater is quite interested in some of these, as he uses them every day in his plant. The nonmetals are oxygen, hydrogen, nitrogen, sulfur, carbon, phosphorous, and so on. These are also used by the electroplater indirectly. For instance, in a nickel bath which consists of nickel sulfate which is made up of nickel, sulfur, and oxygen, the electroplater uses the sulfur and oxygen in order to deposit the nickel.

The number of compounds which can be produced from the 92 elements is tremendous. At present over one-half million are known and our laboratories are turning out new ones each day. It would be impossible for anyone to study each of these compounds intelligently. We are rather fortunate, though, in that only a limited number of these compounds are important and of this number many can be divided into groups which are similar, and by becoming familiar

BETTER PLATING, LESS COST!
"MGC" ELECTROPLATING EQUIPMENT
Write for Interesting Details TODAY!
MOTOR GENERATOR CORP., HOBART SQ. BOX PF 103 TROY, OHIO

ONE HYDRO-WHIRL

COLLECTS DUST FROM

EIGHTY

SEPARATE MACHINES

BUY WAR BONDS

HYDRO-WHIRL

Hydro-Whirl Dust Collectors are engineered to meet any requirements—from 700 to 100,000 C.F.M.—designed for all forms of metal dust (magnesium, aluminum, iron) created from grinding, buffing, polishing, or sanding. The dust is "water-whirled" out of the air and is knocked down into a tank below, from which it is removed periodically as sludge by conveyor.

PETERS-DALTON, INC.

INDUSTRIAL SHEET METAL WORKS

NEW NAME → 630 EAST FOREST AVE., DETROIT 1, MICH.

MFRS. HYDRO WHIRL DUST COLLECTORS AND SPRAY BOOTHS · INDUSTRIAL OVENS, MECHANICAL WASHERS AND VENTILATION SYSTEMS

with one group it is possible to become familiar with the many compounds which make up this group.

Earlier it was stated that our universe is composed of 92 elements. We shall study 30 or 40 of the most important ones. The first to be studied is oxygen. This material has been mentioned several times heretofore. It will be recalled that oxygen was obtained from red oxide of mercury.

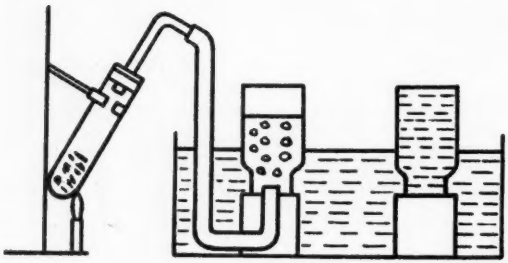


Fig. II

It was mentioned as being a component of water. The electroplater knows it as being a constituent of sulphuric and nitric acids. Oxygen is a very active element and is the most active in the atmosphere. It is impossible for man to survive without this element. All fires would immediately go out if the oxygen were removed.

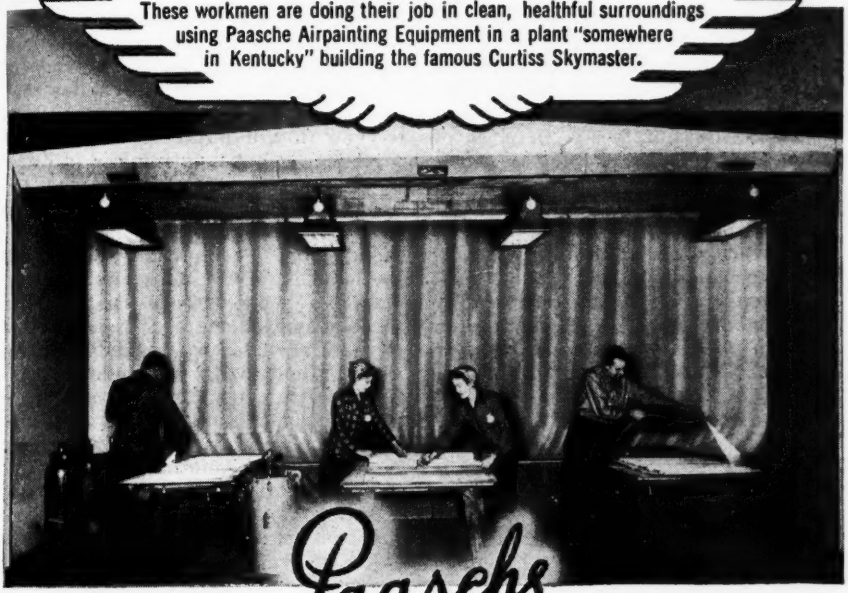
Oxygen can be prepared from water by electrolysis. Then if a direct current is passed through water, hydrogen is obtained at the cathode, while oxygen is produced at the anode. The electroplater in most cases has to guard against oxygen being liberated at the anode in electroplating baths, as this lowers the current efficiency of his cell. Earlier it was pointed out that oxygen was also prepared by heating the red oxide of mercury. Both of these are ways in which to obtain this element. If oxygen is desired in the laboratory it can be prepared by these two methods, but an easier method consists of heating potassium chlorate, a white crystaline material composed of one part potassium, one part chlorine, and three parts oxygen. On heating this material it will be observed that the compound melts around 350 degrees C. Now if the temperature is increased, soon bubbles of oxygen are released. When oxygen leaves the above compound a substance is formed consisting of one part potassium, one part chlorine, and called potassium chloride. This can be represented in the following way:

Potassium Chlorate =
Potassium Chloride + Oxygen.

At this point we shall digress for a moment. If another test tube is partially filled with some crystals of potassium chlorate and then mixed with some finely powdered manganese dioxide, which consists of one part manganese and two parts oxygen, and the two heated, taking care not to let the temperature become as hot as before, it will be found that the oxygen is released much faster than heretofore. If the materials which are left behind are analyzed it will be found that potassium chloride and manganese dioxide are present. By comparing it will be noted that the manganese dioxide goes through the reaction unchanged.

This is rather an important phenomenon which occurs many times in chemistry. This foreign compound or substance which was added hastened the reaction quite markedly, but in itself was not changed one bit. This type compound is called a catalyst or catalytic agent. A catalyst may be defined as being a material which aids a chemical reaction without itself being permanently altered. Time and again it will be seen how a catalyst aids the many chemical reactions to take place faster than they would otherwise.

These workmen are doing their job in clean, healthful surroundings using Paasche Airpainting Equipment in a plant "somewhere in Kentucky" building the famous Curtiss Skymaster.



Paasche

WATER WASH BOOTHS

Eliminate Fire Hazards . . . Assure Clean Exhaust
Conserve Paint . . . Promote Healthful Working Conditions

• Add production hours to your day. Eliminate the time-wasting, hazardous job of spray booth cleaning by installing Paasche Self-cleaning Water Wash Booths. They reduce fire hazards to a minimum and are endorsed by safety engineers and industrial commissions. The Paasche booth is selected where safety is a prime requisite.

• Paasche Water Wash Booths employ a constant curtain of water, and the action of powerful sprays in the water wash chamber to wash down the overspray that otherwise accumulates on the walls of the booth, air distributing plates, fans and exhaust ducts. When air is exhausted, it is clean and free of paint particles. In many cases the precipitated solids can be reclaimed, making a substantial saving!

• A sound, economic investment, Paasche booths usually pay for themselves quickly in time and material saved. Booths are engineered to your individual needs. Write today for full information on Paasche Water Wash Booths and other Manual or Automatic Airpainting Equipment. Paasche Airbrush Co., 1917 Diversey Parkway, Chicago, Illinois.

Paasche AIRPAINTING EQUIPMENT

Manual, automatic and special airpainting equipment, airfinishing booths, pressure regulators, airconditioners for compressed air lines, air dusters and stripers.

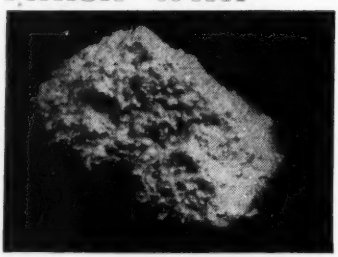
There are many catalysts which are in industrial use today. As a good example of this one might point out the use of nickel and platinum in the hydrogenation of oils. A good example for the electrochemist or electroplater is the sulfate ion in a chromium plating bath. If a certain small amount of sulfate is present chromium will be deposited. If the amount is too large or if this radical is absent entirely no chromium whatsoever is produced.

Oxygen can be made very readily in the laboratory by using potassium chlorate with manganese dioxide as a catalystic agent. Now if these materials are mixed in the ratio of four parts potassium chloride to one part manganese dioxide and placed in a container arranged with delivery tube as in Fig. II, and the mixture is heated, it will produce oxygen which in turn can be collected in wide mouthed bottles which have been previously filled with water. The reason for collecting this gas over water is that oxygen is very insoluble in water. After this the bottles are full of a gas which is assumed to be oxygen.

It has been pointed out earlier that if a glowing splint is introduced into oxygen it will burst into flame. If a glowing splint is introduced into one of the bottles containing this gas, the splint immediately begins to burn with a brilliant flame. This is a test for oxygen. There is only one other gas which will act in a similar way, this gas being nitrous oxide. If a piece of ignited charcoal is held in the oxygen, the charcoal immediately begins to burn with a brilliant flame. This is also a test for oxygen.

Similarly, if a quantity of sulfur is placed in an iron spoon, ignited, and introduced into another bottle of the oxygen, it also burst into a characteristic blue flame. It is even possible to burn iron in this gas. If a piece of watch spring is used as a source of the iron and one end is

Finish with



FLOCK

Rayco Flock is uniformly cut fibres of rayon of cotton, applied to form a leather- or cloth-like surface.

The VERSATILE material of many uses ---

SOUND DEADENING **TEMPERATURE INSULATION**

SHOCK-ABSORBING SURFACE

SIMULATING LEATHER, FABRIC, VELVET, PLUSH

Applied to metal, plastic, wood or paper, Rayco Flock is used to produce a variety of surface effects ranging from leather to velvet, in colors or white. Can also be used to apply decorative designs, as well as for functional uses such as insulation, sound-deadening, etc. We develop special styles to meet special requirements. Tell us your plans and let us offer suggestions.

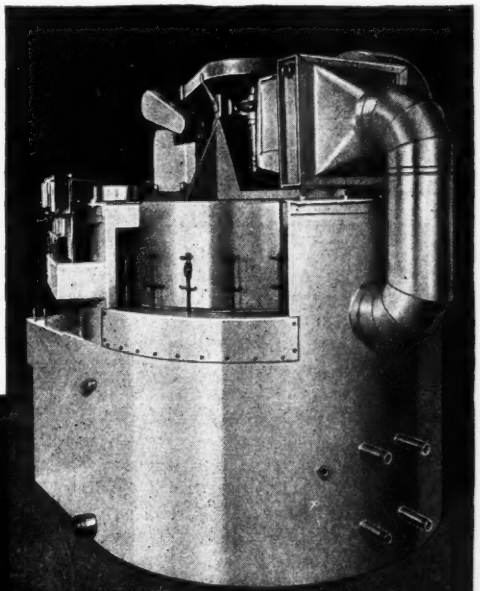
SAMPLES AND PRICES UPON REQUEST.

RAYON PROCESSING CO. OF R. I., INC. • **65 TREMONT STREET CENTRAL FALLS, R. I.**

THE WORK GOES 'ROUND and 'ROUND

WASH . . . RINSE . . . DRY Metal Parts with the NEW *Ransohoff* ROTOMATIC

requires a space only 7' 6" x 6' 6"



All bearings and the driving mechanism are mounted on top of the machine and do not come in contact with the cleaning solution.

N. RANSOHOFF, Inc.

1311 TOWNSHIP AVE.

CINCINNATI, OHIO

coated with sulfur and ignited, then suspended in a bottle of oxygen, the sulfur burns and in turn sets the iron on fire. If a small amount of phosphorous is placed in an iron spoon, ignited, and placed into a bottle of oxygen, a very brilliant flame results. It will be noted that the products of this chemical reaction can be seen, for when this material burns a white

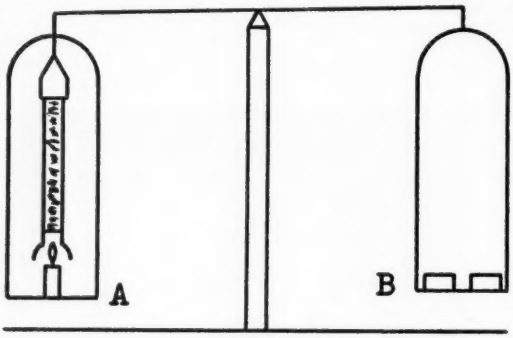


Fig. III

vapor or gas is left behind which is phosphorous pentaoxide. This reaction is represented as shown below:

Phosphorous + Oxygen = Phosphorous Pentaoxide.

From the above experiments one can readily see that any material which will burn in air will burn much faster in oxygen. This gas is colorless, odorless and tasteless and practically insoluble in water. The material is slightly heavier than air. These characteristics are generally called the physical properties of a substance.

It can be seen that oxygen plays an important part in the burning of materials. It might be well worth our time to examine this process to see just what happens in "burning." Lavoisier did some very important experiments some 150 years ago on the process of burning. He heated some mercury in a closed vessel, the outlet of which passed into a jar. After heating the mercury for quite a few hours he noticed that the air which was enclosed in the bottle had decreased one-fifth of its original volume. He found upon examining and testing for oxygen in this air that he received a negative test. He did this by introducing a lighted splint into the closed atmosphere above the mercury and it was extinguished. Evidently the material which caused the burning had been removed from the air.

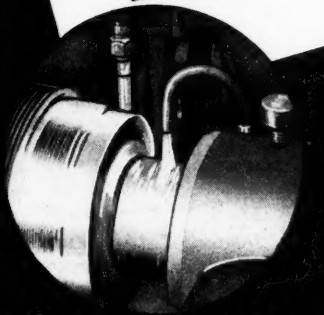
Upon examining the mercury in the retort very closely he found a red powder which had all the properties of red oxide of mercury. This previously had been used by another chemist, Priestley, for preparing oxygen. Lavoisier now reasoned that if the red oxide of mercurcy had come from the union of mercury with the material which was responsible for air supporting combustions, he would be able to decompose this red compound and produce oxygen. He placed the red material in an apparatus and heated it. On collecting the gas, he was surprised to find a volume which corresponded to the shrinkage of the enclosed air in the first experiment. He now tested for oxygen and found that the material would cause a lighted splint to burst into flame, thus he proved that one-fifth of the air was composed of a gas which he called oxygen.

He also found that by taking the residual gas left in the first experiment and mixing it with a quantity of oxygen necessary to produce its original volume a gas was produced which contained all the properties of ordinary air. Therefore, it can be seen that oxygen is the only gas in the atmosphere which is utilized in the process of burning.

One often speaks of a compound as being burnt up or destroyed, but upon investigation it will be found that the

Zephyroid Lubricoolant

makes 5 tools last as long as 7



for THREAD CUTTING, GRINDING, BORING, FACING, DE-BURRING, DRILLING, MILLING, ETC.

A revolutionary new discovery! A *greaseless* cutting, burring, and grinding lubricant . . . completely water-washable . . . holds work to temperatures not measurably above room heat . . . prevents dry welding of chips to the cutting edge of tools . . . reduces tool mortality even at greatly increased RPM . . . produces mirror-finish work . . . no gumminess . . . no decomposition . . . no toxicity.

For specific details regarding the improvements *Lubricoolant* will give *your* operation, write to:

THE DU BOIS CO. CINCINNATI, O.

TRAINED SERVICE MEN AND WAREHOUSE STOCKS IN PRINCIPAL CITIES COAST TO COAST

products which are formed are heavier than the material which was burned. A simple experiment will demonstrate this. If a candle is arranged on a balance pan as in Fig. III, and above it is suspended a tube containing sodium hydroxide or caustic soda, the products of combustion can now be weighed. If the scales are carefully balanced by placing suitable weights on pan "B" and the candle lighted, it will be noticed that if the candle continues to burn, pan "A" becomes heavier than pan "B," regardless of the fact that the candle rapidly disappears; the reason for this is that when a candle burns it forms invisible gases which are, however, heavy. These gases are water vapor and carbon dioxide. The so-called products of combustion are heavier than the original material.

The above can also be illustrated by another experiment. If some iron powder is placed in a crucible and carefully balanced on a balance by the aid of weights, it will be found that if heated in a flame until the iron glows, then cooled, and again weighed, the material will have gained quite a bit of weight. If the contents of the crucible are examined, it will be found that the iron is no longer present, but another compound has taken its place which has a red color. This material is iron oxide.

These experiments show that when certain substances are heated in the air, the oxygen in the air united with the materials forming one or more new compounds and, at the same time, the new compounds which are formed are heavier than the original compounds. Using iron as an example, we can say that the iron uniting with the oxygen forms a new material called iron oxide. It can be seen that the iron oxide is heavier than iron because the second compound has oxygen united with the iron. An oxide may be defined as being a compound of an element and oxygen.

When oxygen unites with a compound oxidation takes place. If the reaction takes place very slowly it does not attract very much attention; for instance, the rusting of iron. If the reaction proceeds very rapidly so that heat and light are produced more attention is attracted, but in both cases oxides are produced. These reactions are generally classified as rapid oxidation or combustion. This is a special case of oxidation or combustion. Thus when coal, wood, oil, gas, and rubber burn we speak of this as being a process of combustion.

Spontaneous combustion is a phenomenon which occurs quite often. If one is so careless as to leave dirty clothes or rags soaked in oil, they will themselves take fire. The reason for this is that the oil is slowly oxidizing and in being oxidized the temperature of the mass is raised, due to the fact that the heat so produced is not conducted away fast enough. Finally, the temperature of the oily rags or other combustible materials is raised to the ignition point and the whole mass will be enveloped in flames.

If an electric spark is passed through oxygen a new material is formed which is called ozone. On investigating it will be found that this material is much more active than oxygen. This can be expressed by the equation

$$\text{Oxygen} + \text{Energy} = \text{Ozone}$$

Different forms of the same element which differ in their energy content are called allotropicic forms. Ozone is heavier than oxygen and is more soluble in water. It is a very good oxidizing agent, even better than oxygen as one would expect. It is used to oxidize different organic compounds and is being used in several French cities to purify the water supply.

(Part 2 will be published in our November issue.)

THE FIREPROOF FINISH FOR WAR PRODUCTS

• **ARMOR-VIT** is the only fireproof, low-temperature, ceramic-type finish for metal products. In application, by spray gun, it is absolutely safe because being non-volatile there is no opportunity for fire or explosion. Once applied and in use, **ARMOR-VIT** withstands temperatures of 1800° F., or any temperature under 1000° F., for continual use.

More than this, **ARMOR-VIT** has exceptional resistance to thermal shock. It has been quenched in ice water from temperatures of 1600° F., and in reverse, has been plunged into boiling water after having been chilled to 150° sub-zero, without failure.

ARMOR-VIT is highly resistant to rust, corrosion, impact, scratch, abrasion, and abuse. It is available in olive-drab, gray and black. Its lusterless matte finish provides low reflectance and necessary camouflage. Being a priority-free finish, **ARMOR-VIT** is making it possible for some manufacturers to substitute iron or steel for the more critical metals such as chromium, zinc, nickel, cadmium, bronze, brass, tin, etc. Investigate **ARMOR-VIT** today. It has remarkable properties.

ARMOR-VIT DIVISION

Although ceramic in nature, there is no comparison between **ARMOR-VIT** *and porcelain enamel, paint, lacquer or synthetic finishes. It is non-volatile, non-explosive. It withstands heat of over 1000° F., and is unaffected by the standard 200-hour salt spray tests, or weatherometer tests equal to 5 years normal weather.*

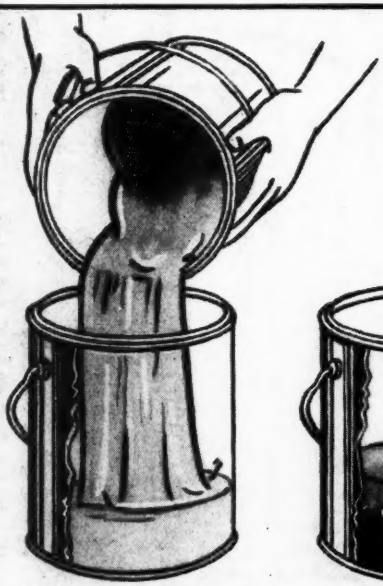
CHICAGO VITREOUS ENAMEL PRODUCT CO.

Cicero, Illinois

A Good Mix-Up Puts

By JEFFREY R. STEWART

THE importance of the proper mixing of various protective coatings before use has, heretofore, only been considered on rare occasions. There are still a few industrial spray shops which fail to make sure that all the ingredients in the paint, enamel or lacquer are com-



Pour off thin portion into a clean container.

Stir the settled paste, breaking up the lumps, if any. For gallon cans, use a paddle about 1½ inches wide.

Mix thoroughly, using a figure 8 motion. Then follow with a lifting and beating motion.

pletely dispersed before application. The present manpower shortage has been partly responsible for this unfortunate condition. It is easy to conceive that a spray mechanic or color blender would be inclined to reduce his time used in preparing the material from, let us say, 30 minutes to 15 minutes in order to speed up his production—especially if munitions are being finished. (Munitions, according to the author, means ships, airplanes, tanks, guns and all field equipment.) However, it is difficult for some to understand why detrimental results would be the outcome of the neglect of such an elementary stage in the industrial finishing schedule.

The purpose of this article, therefore, is to illustrate some of the serious disadvantages of improper or incomplete mixing of paints. The term "paint" or "paints" is used here as a broad term indicating all of the pigmented products such as enamels, paints, and lacquer enamels. It is also the purpose of this article to offer helpful suggestions which will aid industrial consumers of paint in bringing their products to a homogeneous condition before use.

There are three ways to

Continue stirring while gradually returning the poured-off portion to the original container.

Box paint by pouring several times back and forth from one container to the other until uniform.

Fig. 1—Manual method for mixing paint to bring it to uniform composition. This method is popularly known as "boxing." *Illustration courtesy Dr. Henry A. Gardner*

mix a paint. These are as follows: (1) Manual method. (Also known as the "boxing" method.) This is done by stirring with a paddle or spatula, as illustrated in Fig. 1. (2) Mechanical method. This is done by a shaking device, usually operated by an electric motor. (See Figs. 2 and 3.) (3) Periodic inversion method. This is accomplished by turning the container upside down while the paint is in storage prior to use.

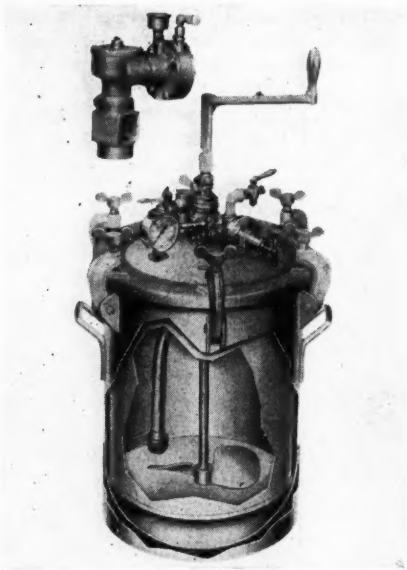


Fig. 2—This cut-away view of a pressure feed tank shows the insert container, fluid tube and agitator. The latter may be propelled by the head crank or air motor shown in the picture or, under certain conditions, by an electric motor.

Photograph courtesy The DeVilbiss Company

The first method, or the manual method, is frequently called "boxing the paint." Before mechanical shakers and agitators appeared on the market about 15 years ago, this was considered the most popular and most desirable procedure. In fact, this method is still widely used in spray shops that do not have mechanical devices especially designed for this purpose. The manual method is described in detail in the accompanying illustration.

The mechanical method is more desirable because it produces a more thoroughly dispersed paint in a shorter period of time and results in a saving of manpower. Paint mixing devices of the mechanical type almost always receive their power source from an electric motor. There are different types on the market; some of these devices operate on a rotary action, some are shuttle-like in movement, and there is even a type with rocking action.

Mechanical paint mixers are necessarily constructed of metal and for this reason are rather difficult to procure at present. It is understood, however, that they are available in limited numbers under the priority regulations of the War Production Board.

The third and last method is that known as the periodic inversion method. It consists of reversing the direction of the paint containers while they are stored in the warehouse prior to consumption in the spray shop. In cases where the material contains ingredients known to have pronounced settling characteristics and the material is to be stored for several months before use, this method is very satisfactory. In fact, if the manpower condition is not too critical, it is suggested that this step be used in conjunction with either of the two aforementioned methods, especially if a considerable amount of time elapses between the date when the incoming shipment of paint is received and stored, and the time when it will be used.

Defects Caused by Improper Mixing

Since the pigments in a paint almost always have a specific gravity which is greater than the vehicle used,

Immediate Shipment
STEEL BOXES
FOR YOUR PRODUCTION NEEDS

STYLE 300 STACKING BOX

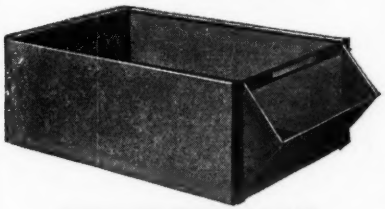
Just right for your small parts. Light in weight, easy to handle. Equipped with drop handle each end. Runners save wear on bottom of box and act as positive stacking lock.

No. 301—6"x 9" x3½" 20 ga., $.55 Each
No. 302—8"x12" x4" 20 ga., .60 Each
No. 303—9"x13½"x4½" 19 ga., .75 Each

STYLE 600 STACKING BOX

An ideal all-pupose shop box. Sturdy all-welded construction. Heavy skids act as positive stacking lock and re-inforce box at point of maximum wear.

No. 601—10"x16"x6" 18 ga., $ .95 Each
No. 602—12"x18"x8" 16 ga., 1.25 Each



STYLE 500 STACKING BOX

Open front makes contents easily accessible when boxes are stacked. Will stack with Style 600 Boxes.

No. 501—10"x16"x6" 18 ga., $1.15 Each
No. 502—12"x18"x8" 16 ga., 1.50 Each

STYLE 100 TAPER PAN

One piece, all-welded construction. Hook handle at each end. Will nest perfectly when empty.

No. 101—10"x18"x6" 18 ga., $ .75 Each
No. 102—12"x20"x6" 16 ga., .90 Each

Prices F.O.B. Factory, Philadelphia—Any Quantity! Order Today—Write, Wire or Phone.

AMERICAN METAL WORKS, INC.

1532 GERMANTOWN AVENUE **PHILADELPHIA 22, PA.**

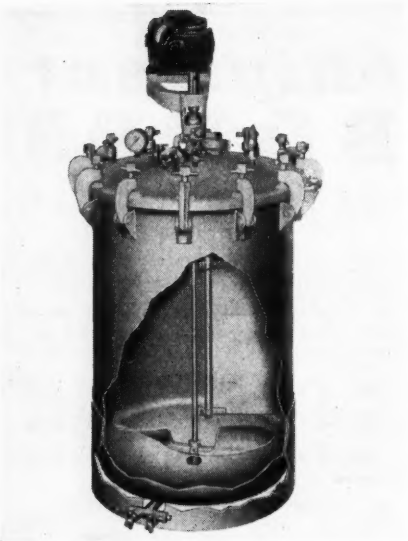
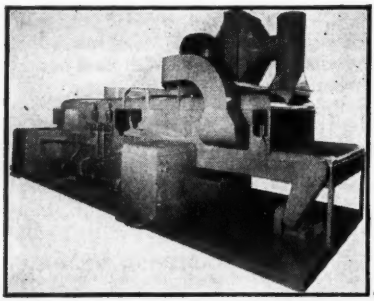


Fig. 3—A large pressure feed paint tank (60 gallons) equipped with electric motor-driven agitator and baffle (above agitator paddle) which prevents the swirl of material and contributes to efficient agitation is shown here. This tank, as will be observed, is provided with bottom fluid outlet.
Photograph courtesy The DeVilbiss Company

it is obvious that there will be a tendency for the former to settle to the bottom over a period of time. Certain pigments are notoriously and inherently bad in this respect. However, to overcome this condition, the paint manufacturer has formulated and adjusted his ingredients to reduce settling to an absolute minimum. It cannot be said, however, that there are very many paints which show no settling at all. For this reason, we will have to assume for the present that the settling of pigments in paints is practically an unavoidable evil or, at least, it is a problem that cannot be entirely eliminated.

Failure, therefore, of the operator to disperse the pigment thoroughly in the vehicle can have serious consequences. Usually, the most noticeable defect is in the gloss of the finish after it has dried to a hard film. Obviously, the layer of the paint used from the upper portion of the container will produce a higher gloss finish than the subsequent portions, in cases when pigment settlement has taken place. Several other defects which will result from such a condition are lack of sufficient hardness of the film, insufficient thickness of the film, a change in the drying time, and so on.

In cases where a sample of the paint must be withdrawn for test purposes in the laboratory, improper mixing of the sample is of even greater importance. Many hundreds of hours of time have been lost by paint chemists in the laboratory because an inspector or clerk failed to do his job properly in the beginning when mixing the material. In cases where paints must first be tested to determine whether or not they meet the required specifications, the failure

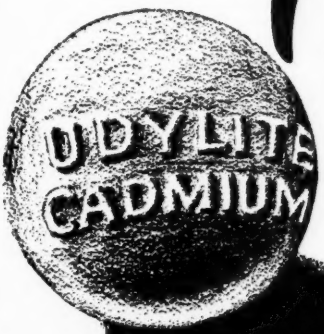


HYDRO-FLOW
INDUSTRIAL WASHING MACHINES

Streamlined design. Recirculating hot or cold air blow off. Hidden motors, pumps and pipes are easily accessible. Piping and nozzles located to insure thorough cleansing of all surfaces. Rugged and efficient pressure pump. Corrosion resistant spray nozzles—from mist to open stream. Handling alkali to varsol as cleaner. Monorail, Belt, or Gravity type conveyors designed to carry any shape or size material. Variable speeds on conveyor drive synchronize production.

INTERNATIONAL CONVEYOR & WASHER CORP.
Write for circular.
640 E. FORT ST. DETROIT, MICH.

More THAN A POUND



In the Metal Finishing field, the name UDYLITE stands for better, more successful Cadmium Plating. . . . Since 1919 Udylite's famous research laboratories and staff of metal finishing engineers have pioneered the use of Cadmium—Developing new and better methods of application—Disseminating this information and improvements to the trade. . . . The benefit of Udylite's years of experience is yours for the asking. When you buy Cadmium Anodes, plating equipment or supplies from Udylite you receive "More than a pound". The "know-how" behind each Udylite product is a *plus value* you cannot find elsewhere. . . . If you are not already a Udylite customer we invite you to enjoy the advantages of Udylite's complete metal finishing service—

★★★
BACK
OUR
BOYS
Buy Bonds

THE UDYLITE CORPORATION

1651 E. GRAND BLVD. • DETROIT, MICHIGAN

Chicago 12
1943 Walnut Street

Long Island City 1, N. Y.
11-16 44th Drive

Cleveland 3
4408 Carnegie Ave.

NOW
Get Faster Cutting
USE ABRASIVE BELTS
on your
GRINDING JACK . . .

with the new

PORTER-CABLE

BACK STAND IDLER

★ Here's the grinding method for top efficiency in your finishing shop. An abrasive belt in place of a grinding wheel gives you faster, cleaner cutting. Runs cooler. Wear is slow and even — holds true cutting surface. Different grit belts can be quickly installed for different jobs.

★ The regular wheel on your jack spindle is replaced by a wheel with just enough resiliency to provide no-slip grip for driving the belt. This eases the contact with the work, prevents "bounce-off," insures a smoother cut. The Back Stand Pulley keeps belt constantly taut and true-faced. No more dressing down worn wheels. Saves in over-all cost, too. Full description on request, or call your Porter-Cable representative—his name is in the phone book.

PORTER-CABLE
MACHINE CO.
302-10 Wolf St.
SYRACUSE, N. Y.

of the chemist to obtain the expected results is frequently traced to a non-representative sample caused by improper mixing.

Follow Instructions Carefully

When the sample is withdrawn from the drum or container, the amount is usually adjusted to about five pounds. However, if it can be mutually agreed between the seller and the consumer, this amount can be reduced to as low as one pound. The following is the standard method of sampling paint as adopted by the Stewart Research Laboratory, Washington, D. C. This is essentially the same as the method used by the American Society for Testing Materials, Philadelphia, Pa.

It is mutually agreed by buyer and seller that a single package out of each lot of not more than 1,000 packages shall be taken as representative of the whole. Whenever possible an original unopened container shall be sent to the laboratory, and when this is for any reason not done, the inspector shall determine by thorough testing with a paddle or spatula whether the material meets the requirement regarding caking or settling in the container. He shall then thoroughly mix the contents of the container and draw a sample of not less than five pounds of the thoroughly mixed paint; place it in a clean, dry metal or glass container, closed with a tight cover, sealed, marked and sent to the laboratory for test with the inspector's report on caking or settling in container. When requested, a duplicate sample may be taken from the same package and delivered to the seller, and the inspector may take a third sample to hold for test in case of dispute.

Accurate, Detailed Records Important

If and when the sample has been properly mixed, and the sample withdrawn, it is important to complete the task by obtaining as much pertinent information as possible. A record of the label used by the manufacturer

DOING A GREAT JOB

No. 608 excels in the three wanted qualities: (1) adhesion to metal, (2) great chemical resistance, (3) fast drying.

●

Splendid adhesion on any clean metal surface no matter how highly polished. Will not pit or etch any metal.

●

All of these proven points make BUNATOL No. 608 the real Stop-Off for use in alkaline plating solutions. If you are interested in testing this remarkable Stop-Off, your request for sample of BUNATOL 608 on your letterhead will bring it immediately.

NELSON J. QUINN COMPANY

TOLEDO 7, OHIO

BUNATOL 608 STOP-OFF

Selective plating in alkaline solutions has always been a trouble-some job. A Stop-Off that will hold-on-the-edge has been in demand in every shop where accurate results are necessary.

BUNATOL No. 608 is engineered to stand up in strong alkali plating solutions such as Copper, Zinc, Tin, Cadmium and Silver. (Also remarkable on those tough Hard Chrome jobs.)

BUNATOL No. 608 is proving a life-saver in many of America's well-known plating shops.

●

Even in very thin films it has extraordinary chemical resistance to the destructive action of strong alkali.

●

Fast drying when applied by brushing, dipping or spraying. Stays where you put it and does not bridge or shrink.

MANUFACTURERS OF

PLATING AND ANODIZING RACK INSULATION *and* **STOP-OFF**

EXCLUSIVELY

SPEED UP PRODUCTION!

Don't let a deburring problem lick you and slow up your production.

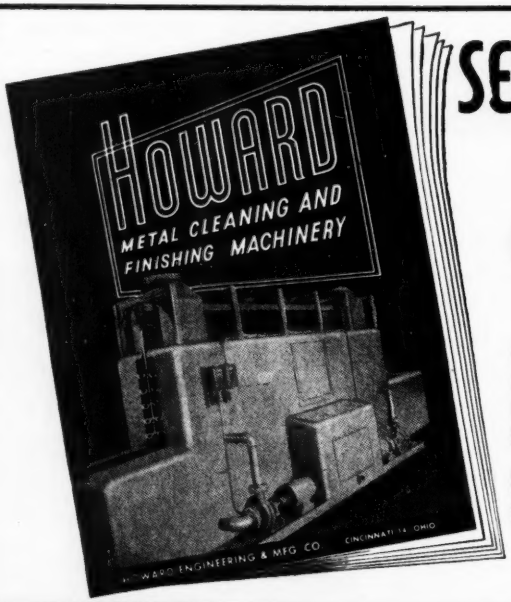
Consult a specialist in the field who is equipped to work out your problem.

Write today to:

LUPOMATIC TUMBLING MACHINE CO., INC.
4510 BULLARD AVE. BRONX, N. Y.

is rather important, especially if a trade name is used. The name and address of the manufacturer is, of course, very important, as is the size and type of container and the net contents. During the past ten years, it has been customary for many paint manufacturers to print the composition of the material on the label. If this is the case, it is very important to record this since it will be the source of a great deal of information to the paint chemist and in many cases will shorten the time and reduce the amount of labor rejuired to obtain the final analytical results.

Instantaneous Fluorescent Starting with the Fostoria Model MF-240-N Generalite flourescent unit is described in a four-page folder available from The Fostoria Pressed Steel Corporation, Fostoria, Ohio. Use of this unit is said to make possible average lumen output, low voltage operation, satisfactory lamp life, and elimination of starting switches. Copy free upon request.



SEND for your FREE COPY OF THIS NEW CATALOG

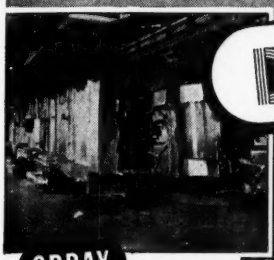
Contains important new data and applications for metal cleaning and finishing machinery.

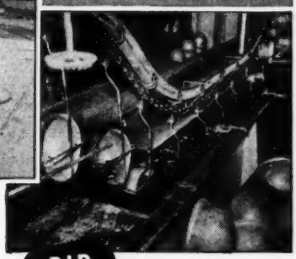
HOWARD
ENGINEERING & MFG. CO.
1056 Hulbert
Cincinnati 14, Ohio

RUST ?

No Problem if you use...

DEOXIDINE





Deoxidine is a time tested phosphoric acid metal cleaner that removes rust chemically from pits as well as from the surface and at the same time destroys or neutralizes rust producers. Deoxidine also removes oil, light oxides, annealing scale, etc., eliminating in many operations the necessity for a separate pickling.

Deoxidine may be applied by dipping, spraying or brushing. There are various types of Deoxidine adapted to the several methods of application and to the cleaning of surfaces with varying amounts of rust and oil.

Deoxidine which introduced the new principle in metal cleaning as long ago as 1916, is a proved material and standard practice.

Write for Service Data Sheet.

Manufacturers of Inhibitors & Metal Working Chemicals

AMERICAN CHEMICAL PAINT CO.

AMBLER ACP **PENNA.**

Note — West Coast Plants may address inquiries and orders for prompt delivery to Leon Finch, Ltd., 728 East 59th St., Los Angeles, California.

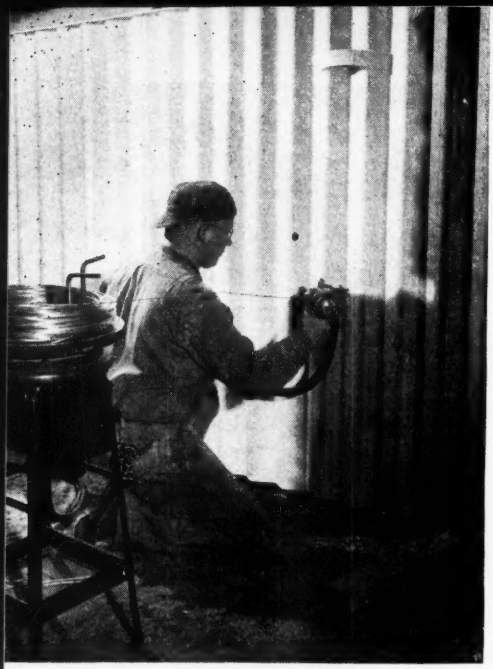
AMERICAN CHEMICAL PAINT COMPANY, AMBLER, PA.

Please send me general Technical Service Data Sheets on

Name_____ Title_____ ☐ *Deoxidine*

Company_____

Address_____ A-10



Melting pots, retorts and annealing boxes made of critical materials must be conserved. Here's how.

By H. S. PICKARD
Metallizing Engineering Co., Inc.

Metcolized Coatings Save Critical Materials

ONE of the most pressing problems confronting industry today is eliminating excessive heat oxidation of melting pots, retorts, boxes and myriad other parts. To obtain best results, heat-resistant alloys were formerly used, but these alloys consist largely of vital strategic metals which are difficult to obtain. The necessity for conserving such parts is, therefore, imperative. A process known as "Metcolizing" is helping to fill this need of industry.

The methods by which articles are Metcolized* are three in number; namely, Process 11, Process 33 and Process 45. The primary requirement is that the surface be 100 per cent clean, rough, and free from all grease or moisture—a condition which is obtained by blasting with angular steel grit. Prepared surfaces are sprayed as soon as possible while still free from oxidation, thus assuring a perfect bond. Heat-resistant metals are sprayed on by means of a metallizing gun. The resultant surface is then covered with a special sealer.

Fig. 1—A retort which was Metcolized only on the area of flame impingement; this procedure proved impractical and was discarded for a more efficient one.

Process 11 produces coatings which will give predictable protection at temperatures up to 1,700 degrees F. and, in some cases, even higher where peak is of short duration. This process is the least costly to apply and involves spraying an aluminum coating, over which is brushed a coat of special sealer. Next, a specific heat treatment, which causes the aluminum to alloy with the parent metal, is required before placing the article in service.

While in service, the aluminum continues to oxidize on the outside and diffuses into the base simultaneously until the aluminum has disappeared. The resultant surface provides the necessary protection.

In Process 33, the sprayed metal used is a nickel-chromium alloy. The aluminum in this process is supplied in the sealing agent and is used where temperatures of 1,800-1,900 degrees F. are encountered and no sulfurous gases are present. This process, while in itself slightly higher in cost, is still competitive with Process 11 because parts are placed in service immediately, and charges for specific heat treating are eliminated. In the lower temperature range, proportionately longer life and better results are obtained over Process 11.

Process 45 combines both Process 11 and 33 with a 50 per cent heavier coating of nickel-chromium alloy provided and is used for all temperatures, whether or not sulfurous gases are present. As in the case of Process 33, no special heat treating is necessary because, in the initial heat

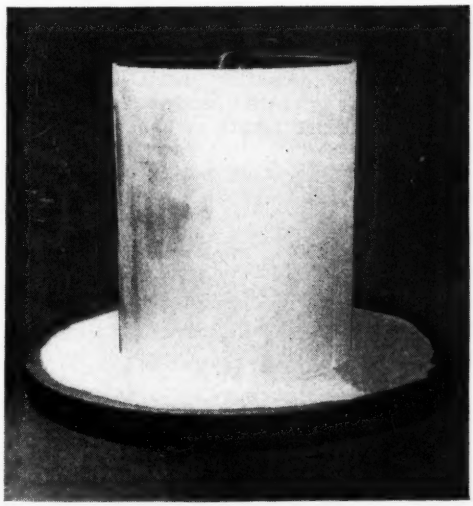


Fig. 2—A retort which has been Metcolized over its entire length.

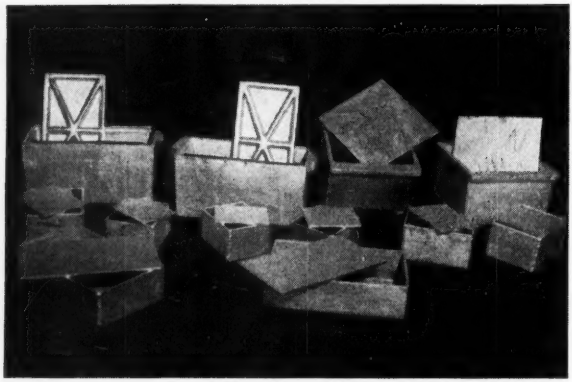


Fig. 3—Annealing and carburizing boxes shown here are treated on the outside only, with a resultant high increase in service.

in service, the aluminum melts and is absorbed into the nickel-chromium, penetrating it and alloying with the parent metal. The ultimate result is a skin consisting of five layers, thus producing a coating highly impervious to heat oxidation.

It must be emphasized, however, that sprayed metal coatings give surface protection only, and do not add structural strength to the article.

The sealing agent mentioned above and known as "Metcoseal"* contains, among other things, aluminum in solution. When the Metcoseal is subjected to heat, it blisters and peels; but when this occurs, the seal has performed its function and, the residue being of no further consequence, can easily be removed by wire brushing, leaving a dark silvery sheen.

The following paragraphs present factual information on equipment Metcolized for the Volco Brass and Copper Company, Kenilworth, New Jersey. The knowledge gained from their experiences will undoubtedly be of value to users of heat-treating equipment.

Several years ago, this company decided to Metcolize their wire annealing retorts, which were subject to scaling. These retorts were used in both gas and electric furnaces, working around the clock every day. They were brought up to 1,150 degrees and held there for an hour. To facilitate production, the retorts were then moved under a cold water shower and chilled, ready for the next heat. The flame impinged at a 45-degree angle, carried on around and upward. These circumstances combined to create a rather severe condition.

The first retorts were Metcolized with Process 33 on the area of flame impingement only (see Fig. 1), which shortly thereafter proved impractical as the uncoated section scaled away. The entire length of the retort, with

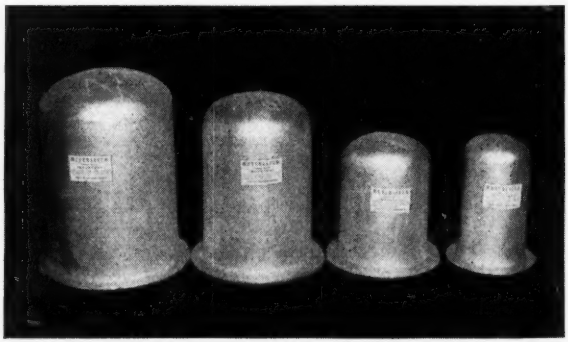


Fig. 4—Pressed steel salt and cyanide pots which have been treated with Process 33 for longer life.

In the interest of conservation of strategic materials:

"TP" SAYS DON'T

DON'T store or use abrasive grain where oil or oily dust will drop on it.

DON'T recoat a wheel without removing all grease from the surface.

DON'T attempt to recoat a wheel if it is unfit due to uneven wear.

DON'T try to coat cold abrasive.

DON'T use green wheels before glue has dried thoroughly.

DON'T use made-up glue if it is either too hot or too cold.

DON'T neglect the temperature and humidity of the drying room.

DON'T drop the coarse grit size in the fine trough by careless handling.

DON'T use the same glue brush for both coarse grits and fine grits.

DON'T attempt to "break" or "mellow" the surface of the wheel by pounding with a sledge hammer while it is mounted on the spindle.

DON'T leave old glue in the pot with steam on overnight.

These and a lot of other "don'ts"... and a great many "do's" as well... of good polishing room practice are included in the booklet "Aloxite-TP" Modern Polishing Practice. Write today for your free copy.

CARBORUNDUM
ABRASIVE MANUFACTURERS

THE CARBORUNDUM COMPANY, NIAGARA FALLS, N. Y.

REG. U. S. PAT. OFF.

Sales Offices and Warehouses in New York, Chicago, Philadelphia, Detroit, Cleveland, Boston, Pittsburgh, Cincinnati, Grand Rapids

(Carborundum and Aloxite are registered trade-marks of and indicate manufacture by The Carborundum Company)

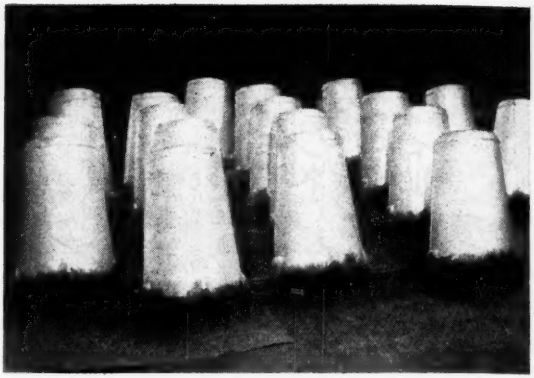


Fig. 5—The number of magnesium melting crucibles required for a given amount of work has decreased since adoption of the Metcolizing process.

the exception of the top, was then metallized, as shown in Fig. 2. After a five-month period, they had to be discarded as the bell on the bottom became badly distorted. A change in design was made, substituting a 1½ x 1½ x ¼-inch angle iron for the heavy iron bell.

After two years of service, the retorts failed—not because of coating failure, but because of structural weakness caused by disintegration of the uncoated top weld. The weld could not be rewelded, as the life was completely burned out of it. This top weld is now being metallized, thus assuring an indefinite length of service.

These retorts, formerly fabricated from heat-resistant alloys, are now made from ordinary hot rolled steel, which, after Metcolizing, compare favorably with the former material. It is interesting to note that since some fifty retorts were Metcolized for this company, in no case was the coated surface the cause of failure. Of further interest is the fact that where buckling and distortion occurred, the coatings were still intact, indicating a proper fusion.

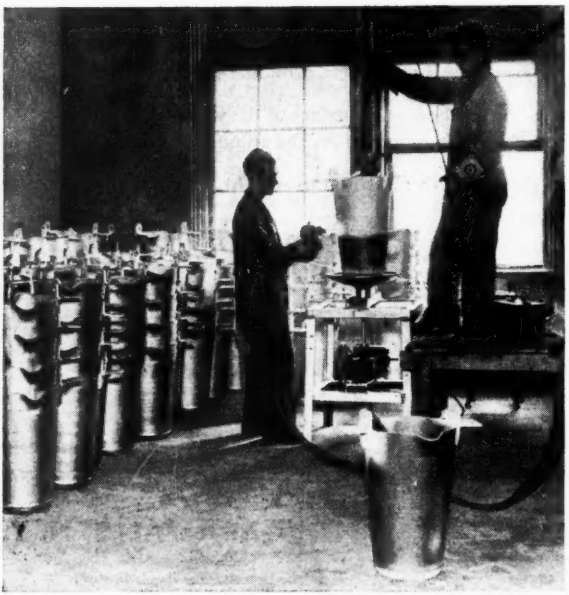


Fig. 6—Spraying magnesium melting pots; both the inside and outside are metallized.

The annealing and carburizing boxes displayed in Fig. 3 are treated on the outside only, and in service have shown an increase of from 700 to 900 per cent. In this instance, the protection of weld metal is paramount.

MEMO
TO: *Producers of War Materials*

URGENT: STOP CORROSION ON ZINC PARTS

✓ *The Alronox Process*

THE ALRONOX PROCESS Eliminates This Problem

This process is an extremely simple method of producing an even, black, corrosion resistant coating, on zinc or zinc alloy surfaces, by immersion.

Check these facts on Alronox against what other processes offer and see the difference:—

• Non-electrolytic • Low temperature-212°F. • Fast production —7 minute cycle. • Simple equipment • No elaborate controls • Even, dense black surface • Low reflectivity • Adaptable to all zinc and die-cast surfaces. • 200-300 hours salt spray rating on .0002 zinc plate over steel without after coating (no rust). • Excellent base for organic coatings. • High weather and humidity resistance. • Can not chip or peel. • Low cost.

Experienced engineers immediately available for consultation. Samples finished without charge.

WRITE . . . WIRE . . . PHONE

ALROSE CHEMICAL COMPANY

PROVIDENCE, RHODE ISLAND, U. S. A. TEL. WILLIAMS 3000-3001

Figure 4 illustrates pressed steel salt and cyanide pots treated with Process 33 and reports on large numbers of these indicate complete satisfaction on the part of the user.

Magnesium melting crucibles, shown in Fig. 5, are also reducing the number required to do a given amount of work. In this case, the process varies with local conditions and the time allowed to bring the magnesium up to 1,650 degrees F.

A partial list of typical applications includes steel saggers, pyrometer supports, burner caps, radiant superheater tubes, rotary furnaces and kilns, furnace conveyors, mufflers, baffles, furnace castings, and structural steel, representing savings in both design and replacement. Figure 6 shows the operation of metallizing magnesium melting pots; both inside and outside are coated.

These applications can be made by any metallizing operator as the procedure is relatively simple. Precautions should be taken, however, to follow exactly the various steps necessary to insure successful results.

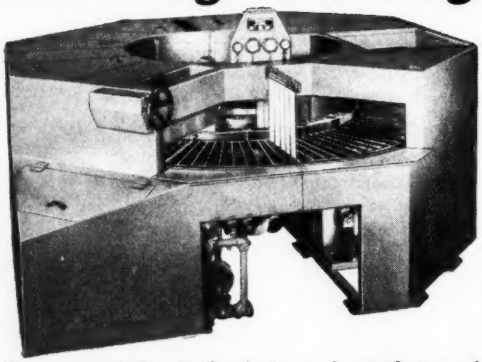
Furnace structural steel, water walls and other large areas can generally be Metcolized after fabrication, thus assuring complete coatings over all welds, bolts and nuts. These processes permit the use of low carbon steel which simplifies the manufacturing of parts and drastically reduces costs.

Process 11 is available to any concern wishing to use it and instructions will be furnished on request. Processes 33 and 45 are covered by U. S. Patent No. 2,300,400 and can be used only under license.

*Trade names reg. U. S. Pat. Off.

Please mention PRODUCTS FINISHING when writing to advertisers.

For Tough Cleaning Assignments



Multiple Stage Automatic Cleaning and Drying Machine

(Patents Applied for)

One Man Operated

A number of these machines of various sizes and designs have been in successful operation for several years.

Economical, require minimum floor space, unequalled for quick cleaning all kinds of machine parts, tote boxes, cans, containers, etc.

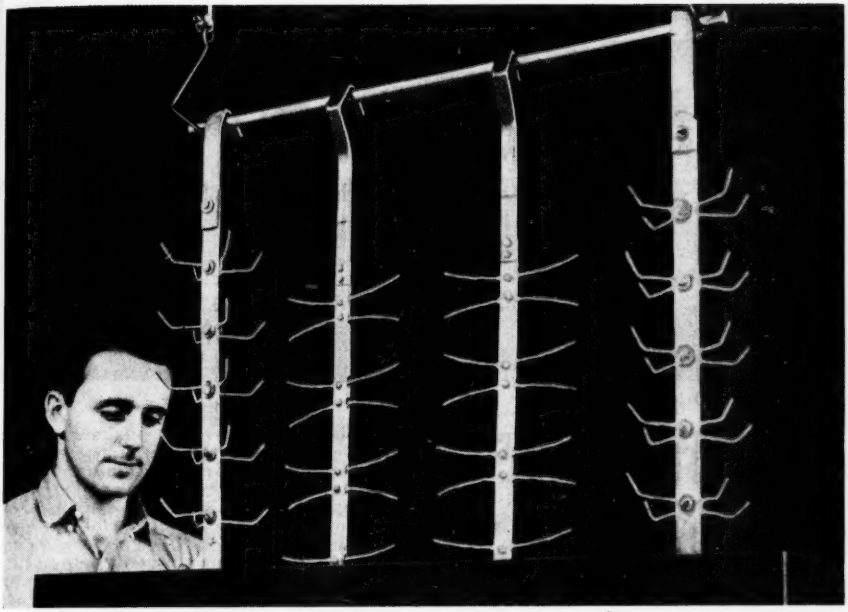
Parts to be cleaned are placed on Roto Table, shown in machine illustrated, or they may be placed in baskets.

We are specialists in the design and manufacture of other types of Cleaning Equipment, also machines for Pickling, Drying and Rustproofing.
Our Engineering Department will be glad to aid in solving or improving your cleaning problems.

Consult us without obligation. Ask for Folder PF.

METALWASH MACHINERY CO.

149-155 Shaw Avenue Irvington, N. J.



The Application in Your Plant of "MICCRO RACK COATINGS"

is *Simple, Fast, Inexpensive*

In the usual cleaning and plating cycles no protective coatings are more effective than "Miccro" materials, yet their application requires only three simple operations. The rack is thoroughly cleaned before receiving the first coat . . . is dipped the recommended number of times . . . is hung up to air-dry after each dip. No tape or special treatment is needed. When especially fast drying is required, the materials may be force dried.

While it is possible to satisfactorily dip racks by hand, the use of some sort of mechanical dipping equipment is desirable. The only equipment necessary consists of a very simple dipping machine which usually can be built with parts and materials often on hand in the average plant. A blue print showing typical construction and parts necessary will be furnished free of charge upon request to this company.

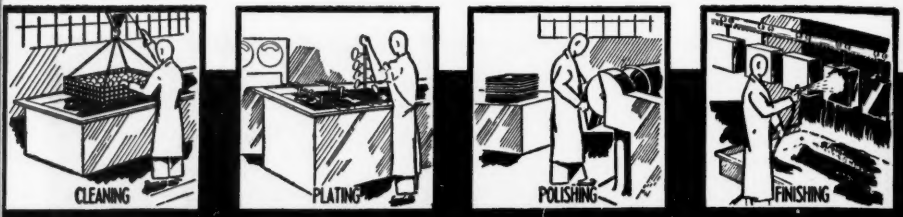
Full information on the materials best suited to various applications will be supplied immediately upon request.

MICCRO-SUPREME STOP-OFF LACQUERS • MICCROLITE • MICCROFLEX

DEVELOPED AND MANUFACTURED BY EXPERIENCED PLATERS

MICHIGAN CHROME & CHEMICAL CO.

6342 EAST JEFFERSON • DETROIT 7, MICHIGAN



News of the Industry

Detrex Corporation Is New Name of Detroit Rex Products Co.

Robert A. Emmett, president and chairman of the board of Detroit Rex Products Company, states that Detrex Corporation replaces Detroit Rex Products Company as the new firm name. No change in ownership, company policy or management will be made.

This company, which manufactures degreasers, alkali and petroleum spirits washers and emulsion cleaners, degreasing solvents and alkali cleaning compounds, was established in January, 1920. The trade name "Detrex" is particularly significant in the new title; more concise, and more easily pronounced, the new name promises to be of increasing value in the future.

White Star Added to Ferro's "E" Pennant

Producers of numerous essential war materials, the Ferro Enamel Corporation, Cleveland, Ohio, has recently received its second Army-Navy "E" Award for continued production excellence. Under Secretary of War, Robert E. Patterson, in informing the organization of the award, paid tribute to the "high standards that . . . won you distinction more than six months ago" and have been fully maintained since that time.

The Ferro organization has made several important technical contributions to the war effort, some in fields far removed from its regular business. Possibly the most spectacular of these is the development of a new refining process for extracting cobalt and nickel from low grade ores. To adapt this process to the needs of the war effort, a new million dollar plant—the only one of its kind in the country—has been put into operation by Ferro, under contract with the Metals Reserve Corporation.

Roxalin Promotes J. F. Burrowes

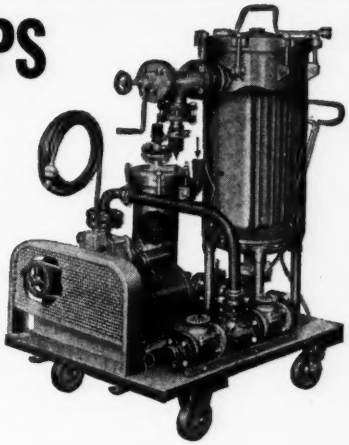
Roxalin Flexible Finishes Inc., Elizabeth, N. J., announces the promotion of

J. F. Burrowes

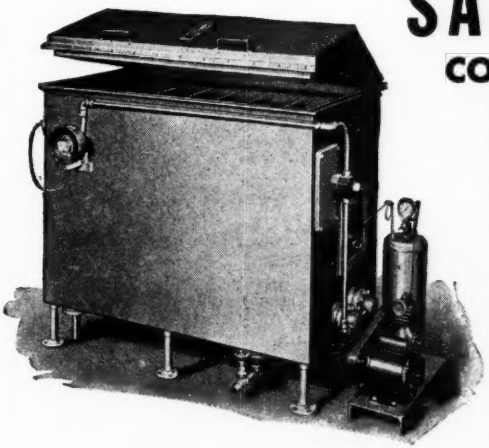
J. F. Burrowes to the position of manager of technical service. Mr. Burrowes is advanced to this new position after

FILTERS & PUMPS

For Filtering, Pumping, or Circulating:—
ELECTROPLATING SOLUTIONS
DEGREASING SOLVENTS
CLEANERS
OILS
COOLANTS
LACQUERS
KEROSENE
VARNISH
ALCOHOL AND OTHERS



We carry a large stock of Filter and Pump accessories, hose, valves, fittings. All grades of filter cloth, filter aids, and FILTERBESTOS. Ready for shipment.



SALT SPRAY

CORROSION TEST EQUIPMENT

Designed to determine the corrosion resisting qualities of plated or coated metal, alloys, metal parts, organic finishes, etc. This equipment combines necessary features so that Salt Spray tests can be conducted to specifications at Controlled Temperatures from 65 to 140 Deg. Fah.

"Write for New Literature and Particulars"

INDUSTRIAL FILTER & PUMP MFG. CO.
1625 WEST CARROLL AVENUE CHICAGO, ILLINOIS

one year as assistant manager of technical service. Prior to this he represented Roxalin for four years as field service man in New England.

C. C. Helmle Joins Enthone Company

Dr. Walter R. Meyer, technical director of The Enthone Company, New Haven, Conn., has announced that Clarence C. Helmle has joined the technical staff of the company. Mr. Helmle is a chemical engineer, a graduate of Rensselaer Polytechnic Institute, class of 1932. After graduating, he went with the General Electric Company's Bridgeport Works, where he was successively plating analyst, chemist and finally head of the inorganic laboratory in charge of electroplating, metallurgy and general chemistry.

Mr. Helmle has been very active in the electroplating field. He is Supreme Second Vice President of the American Electroplaters' Society and past officer of the Bridgeport Branch of the society. He is a member of the Electrochemical Society and was an instructor for several years in chemistry, electrochemistry and metallurgy at the Bridgeport Engineering Institute. Mr. Helmle will be engaged in plating equipment design, process development and technical service.

Chicago Vitreous Appoints Strandlund

A recent announcement from the Chicago Vitreous Enamel Product Company, Cicero, Ill., tells of the appointment of Carl G. Strandlund, formerly in charge of their armor-plate division, to the office of vice president and general manager. Prior to his service with Chicago Vitreous, which started some 18 months ago, Mr. Strandlund had been a nationally-known consulting engineer.

Hugh A. Todd

Hugh A. Todd, one of the pioneer figures in the Hanson-Van Winkle-Munning Company, and in the plating industry of the East, died on July 31, 1943, after an illness of several months. More than 40 years of his life had been spent in the industry, starting with the predecessor companies which now form the Hanson-Van Winkle-Munning Company. For many years past he had been New York State representative for them with headquarters at Syracuse, and in this capacity he supervised the sales of H-VW-M products throughout upper New York State. His work is now being carried on under the guidance of Robert M. Norton.

Kurt W. Renson Added to Turco Staff

Kurt W. Renson, industrial chemist, has joined the Los Angeles laboratory staff of Turco Products, Inc. Mr. Renson is a member of the American Chemical Society and was graduated in 1930 from the College of Industrial Chemistry in Vienna.

Kurt W. Renson

Clarence J. Huff

Clarence J. Huff, vice president in charge of sales of The Procter and Gamble Company, Cincinnati, Ohio, since 1938, died very suddenly at his summer home at Hampton, N. H., on August 17. His death closed a career of 53 years with the company. In 1890, Mr. Huff joined Procter and Gamble as an

Looking for Information?

Need a little help on that metal problem of yours?
Want to speed up production of some particular war product, or see if you can save some metal somewhere along the production front?

Then come to Chicago the week of October 18 and attend the National Metal Congress and War Conference Display. Devoted to increased production of war products, to conservation of materials, and to post-war planning, this great event of the metal industry will help you solve many problems.

We've a big production job still ahead of us. We need all the information and new developments that will improve the efficiency of armament production. So mark your calendar now — and plan to be in Chicago when the metal industry meets the week of October 18.

THE PALMER HOUSE
Chicago - October 18 thru 22

NATIONAL METAL CONGRESS
and
WAR CONFERENCE DISPLAY

● **Thousands of visitors to the Metal Congress will look to the hundreds of War Conference Displays for new products, new processes, and new developments. 65% of the available display space has been reserved in the first four weeks following announcement of this 25th Annual Conference Display.**

But excellent display room locations are still available. For complete information, write or wire the American Society for Metals, 7301 Euclid Avenue, Cleveland 3, Ohio. Phone: ENdicott 1910.

NATIONAL METAL CONGRESS AND WAR CONFERENCE DISPLAY
Under the direction of the American Society for Metals, in cooperation with the American Welding Society, the Wire Association, and the Institute of Metals and Iron and Steel divisions of the American Institute of Mining and Metallurgical Engineers.

office boy and clerk in the Boston sales office. In 1896, he became a retail salesman, traveling throughout New England. He later went to New York as a jobbing salesman and came to Cincinnati in 1912 as manager of the central sales division. Subsequently he held the positions of manager of the case goods sales department, general sales manager and vice president in charge of sales.

Army-Navy "E" Awarded Chicago Wheel

The Chicago Wheel & Manufacturing Co., Chicago, Ill., was honored at plant ceremonies held in Chicago recently when the Army-Navy "E" Award Pennant was presented by Col. C. J. Otjen, Commanding Officer, 3rd District, 6th Service Command. The presentation of employee merit pins was made on behalf of the United States Navy by Lt. Comdr. E. R. Smith. Col. Otjen pointed out that "the outstanding and unusual record of the company in the production of small grinding and mounted wheels, largely as sub-contractors, merited the special recognition." A. T. Dalton, secretary, pledged renewed efforts to strive for increased quality and quantity of production as a further contribution of the war effort. Appreciation for the honor bestowed upon the company was expressed by A. J. Miller, manager of the firm.

Addition to Pennsalt Staff

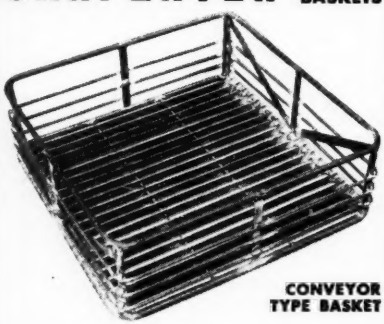
The Pennsylvania Salt Manufacturing Company, Philadelphia, Pa., announces the addition of Horace F. McIntyre to

Horace F. McIntyre

its Pennsalt Cleaner Division as a sales and service representative to cover the Philadelphia territory.

Howard Metal Cleaning and Finishing Machinery is the subject of a book which contains important data on metal cleaning and finishing machinery, and the application of such equipment. A copy of the book may be obtained upon request from Howard Engineering & Mfg. Co., 1056 Hulbert St., Cincinnati 14, Ohio.

CARPENTER METAL BASKETS



CONVEYOR TYPE BASKET

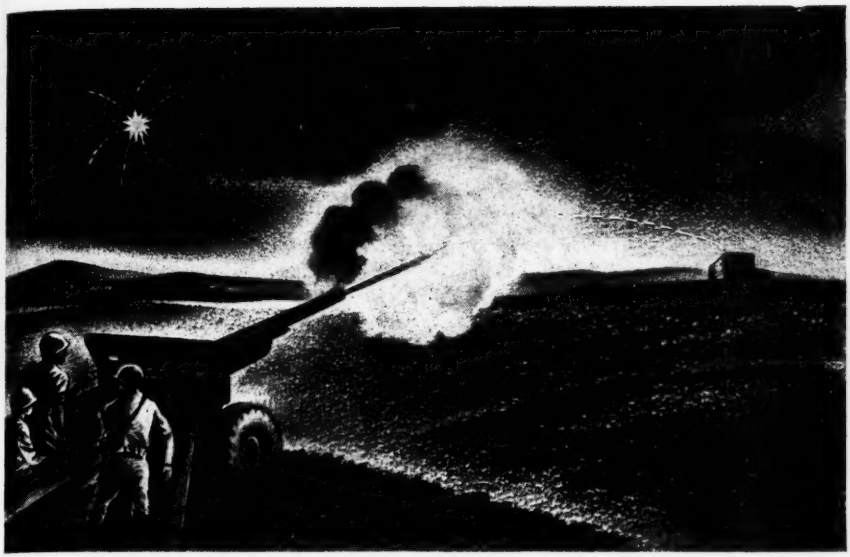
Carpenter metal baskets are made to meet practically every cleaning, pickling, washing, and heat treating operation. They can be supplied in steel, stainless steel, Monel metal, and Inconel—in sizes and types to suit your needs.
Write for illustrated folder describing our complete line of baskets.

"If it's a metal basket we make it."

THE CARPENTER METAL PRODUCTS CO.
446 East 131st St. Cleveland, Ohio

SOL-KLEAN
for
Better Paint Adhesion

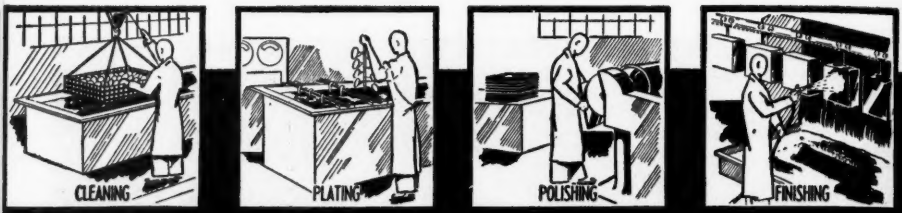
INDUSTRIAL CHEMICAL PRODUCTS CO.
DETROIT 7
Milwaukee Fort Wayne



Military Objectives

War-time research . . . born of stark necessity . . . has a wholly military objective. It has not tried to alter America's post-war industry. But already it has altered it almost beyond possibility of recognition. Under its continued stimulus new industries will spring up . . . competitive situations will alter . . . new products and new leaders will arise. Contact with war-time research affecting YOUR industry will enable you to keep pace with these startling post-war developments. Stanley chemists have pioneered in the field of coatings. Intricate problems relating to war-time finishes have been solved . . . uncovering startling developments which, when the war is won, may well revolutionize YOUR peace-time products. Be prepared—participate in present research by securing now the answers to your war-time finishing problems. When the war ends . . . you will be ready for their post-war application. Address The Stanley Chemical Company . . . manufacturers of Stanley Lacquers, Enamels, Synthetics and Japans . . . East Berlin, Connecticut.

Stanley Chemical



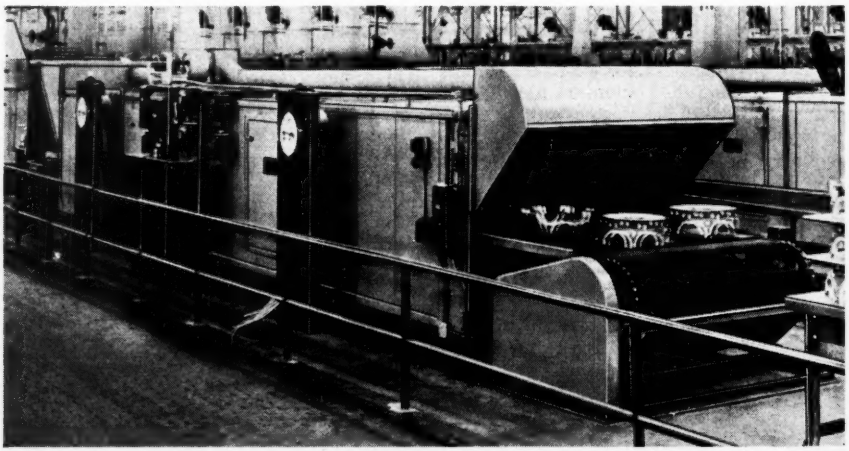
New Equipment and Materials

Gehnrich Continuous Paint-Baking Oven

The illustration presents an installation view of a conveyor-type oven for baking paint on miscellaneous aluminum alloy parts of different sizes and weights. The oven, which was designed and built by The Gehnrich Corporation, Long Island City, N. Y., is in use in an airplane engine plant.

The oven of insulated dual panel steel construction houses a flat screen belt continuous conveyor 40 ft. long and 5 ft. wide. The belt is supported on cross flights fitted into heavy duty roller chain driven oven sprockets, through a speed reducer and a variable speed drive.

The oven has a fuming or exhaust zone into which heated air at 150 to 225 deg. F. is supplied in sufficient volume to volatilize the paint solvents. The baking zone is heated by electric heating elements to 350 deg. F., with complete uniform air circulation over the heaters, through the conveyor and the work to a recirculating fan mounted on the oven roof. The temperature is held within close temperature limits by automatic indicating and recording controllers and fool-proof heating protection is provided by safety switches for shutting off heat-



Gehnrich Continuous Paint-Baking Oven

ing load and motor circuit in the event of power or fan failure.

Each oven has beside it a wire mesh belt, two-strand roller chain conveyor for returning the base plates (on which the painted parts travel through the oven) to the loading end of the oven.

Ceratherm 500

A chemical stoneware that will withstand violent thermal shocks has been announced by The U. S. Stoneware Company, Akron, Ohio. The stoneware, known as "Ceratherm 500," is said to be the first low-porosity chemical stoneware that can be heated by direct steam or hot gases, and that can be cooled quickly.

It is claimed that Ceratherm 500 actually increases in strength when heated to 400 deg. F. and quenches, and shows no loss of strength after repeated heating to this temperature and cooling. Ceratherm 500 is now in large scale production on such items as tanks, crocks, boiling kettles, mixing kettles, cooling and condensing coils, exaporating dishes, and so on.

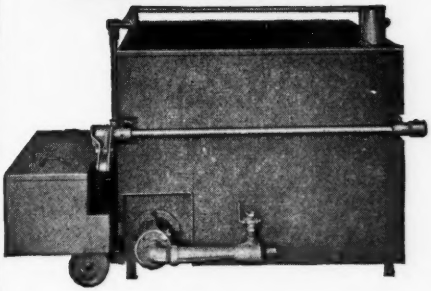
Sundstrand Model 1000 Sander

Designed and built for all practical hand sanding and finishing operations, the Sundstrand sander manufactured by Sundstrand Machine Tool Company, Rockford, Ill., is now available in a light-weight, hi-speed Model 1000. Smaller and lighter than previous models, the machine weighs less than 6 lb.; has a speed of 3,500 oscillations per minute; can be equipped with different types of sand paper attachments for large or small, wide or narrow, flat or curved abraiding surfaces on metal, wood, plastics or composition.

Operation of the machine is obtained with pad movements started and controlled by a palm lever fitted at top of the machine housing. No turning of "on" or "off" switches is required. When the machine is gripped to operate, the reciprocating action of the pads starts. Upon release, the machine automatically stops.

The sander is said to be free from vibration. Opposed pad action and balance of moving parts eliminate vibration and improve the qualities and uniformity of the finished product. Elimination of vibration reduces fatigue and increases the efficiency of the operator.

METAL PARTS CLEANING
Low Cost -- Efficient



"STURDY-BILT" *Simplex*
METAL PARTS CLEANER

A small compact, mechanically simple unit combining ACTIVE-SOAK with WASHING ACTION. Removes oil, grease, chips from metal parts, assemblies castings, etc.

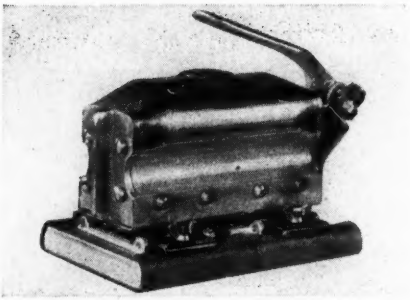
Operator simply loads tray — presses a switch and the "Simplex" does the rest. Can be installed individually in different departments or in a series for consecutive steps of cleaning, rinsing, coating or treating.

NOW . . . S-B DRYERS for complete installations of cleaning and drying parts.

Write for Complete Information

STURDY-BILT EQUIPMENT CORP.
DEPT. P-10 **WEST ALLIS, WISCONSIN**

Also manufacturers of "Sturdy-Bilt" Soaker-Hydro continuous production and parts cleaners.



Sundstrand Model 1000 Sander

Uniformity of the stroke and the high speed of the reciprocating pads materially increase the life of abrasive paper by keeping the paper surface substantially free from material particles.

"Absorbo"

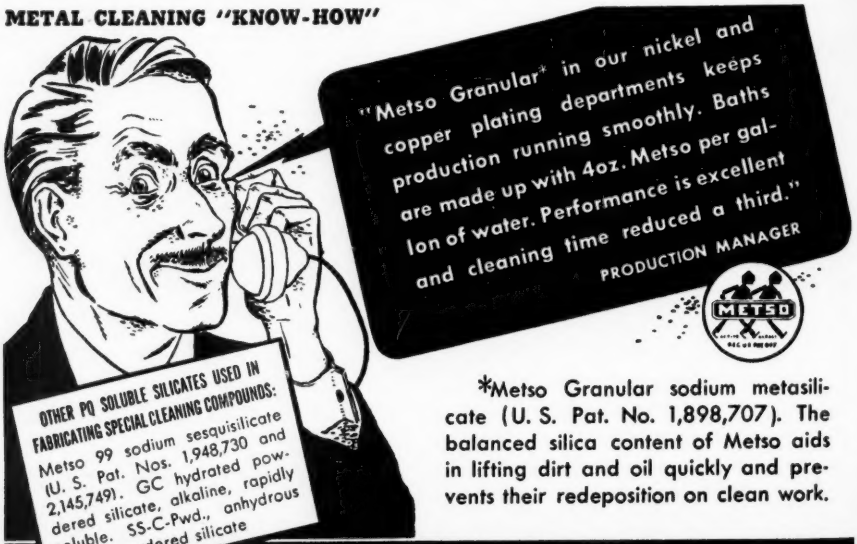
An oil and grease absorbent and floor cleaner, to be marketed under the name "Absorbo," has been developed by the Fidelity Chemical Products Corporation, Newark, N. J. The product is listed by the Underwriters' Laboratories, Inc., as a Class 1 non-combustible absorbent "for reducing fire and slipping hazards and for cleaning floors."

Though granular in form, Absorbo is non-abrasive and will not damage machinery or working parts due to abrasive action. It is also odorless, nonpoisonous, and non-injurious to skin, clothing or flooring, according to the manufacturer. It may readily be spread by hand and used on any type of floor surface. It absorbs up to 45 to 50 per cent of oil or grease by weight.

Kocour Analytical Sets

A line of analytical sets for determining the condition of acid pickle or alkaline cleaning solutions has been placed on the market by Kocour Co., 4724 S. Christiana Ave., Chicago 32, Ill. During use acid pickle solutions build up in salts and decrease in effective acidity. As most efficient and economical operation is obtained when optimum acid quantity is present, control is essential. Alkaline cleaners lose effectiveness by being fouled by the material removed

METAL CLEANING "KNOW-HOW"


"Metso Granular* in our nickel and copper plating departments keeps production running smoothly. Baths are made up with 4oz. Metso per gallon of water. Performance is excellent and cleaning time reduced a third."
PRODUCTION MANAGER
METSO
OTHER PQ SOLUBLE SILICATES USED IN FABRICATING SPECIAL CLEANING COMPOUNDS:
Metso 99 sodium sesquisilicate (U. S. Pat. Nos. 1,948,730 and 2,145,749). GC hydrated powdered silicate, alkaline, rapidly soluble. SS-C-Pwd., anhydrous powdered silicate

*Metso Granular sodium metasilicate (U. S. Pat. No. 1,898,707). The balanced silica content of Metso aids in lifting dirt and oil quickly and prevents their redeposition on clean work.

PHILADELPHIA QUARTZ COMPANY

GEN'L OFFICES IONIC AND THIRD STS., PHILA., PA. • 9 PLANTS • DISTRIBUTORS IN 65 CITIES

ENGINEERING AUTHORITIES SPECIFY DU-LITE for Engines

Du-Lite is used by leading airplane engine manufacturers. They have found that performance is actually improved by the use of Du-Lite finished parts. The deep penetration of Du-Lite provides maximum aid to lubrication.

The microscopic sharp corners, found on even high polished bearing surfaces, are smoothed by the Du-Lite processing. The layer of black oxide produced absorbs and holds oil. This results in a lower coefficient of friction and prevents galling of closely fitted bearings during breaking-in periods.

Du-Lite is used on other engine parts as a protection. Here again the deep penetration is important for it provides maximum rust resistance.

Du-Lite Engineers are located in the chief industrial centers and are at your service for consultation and advice. Your inquiries will have prompt attention.

DU-LITE CHEMICAL CORP.
MIDDLETOWN, CONNECTICUT

Quilted Asbestos Mitt won't fray

ON TOUGHEST JOBS

Troubled executives find new *QUILTED* asbestos mitt *won't* shred, *won't* fray on tough jobs handling hot metals, molds, other hot materials. Quilted both sides, reversible to fit either hand; gives double duty, double wear. Just one of many interesting Safety Ideas invaluable to production-minded executives. 4300 items in line — gloves, aprons, sleeves, spats, etc.

Send for new catalog now.

INDUSTRIAL GLOVES CO.
746 GARFIELD BLVD. DANVILLE, ILLINOIS
(In Canada: Safety Supply Co., Toronto)

SPECIFICATIONS!

+

PLUS

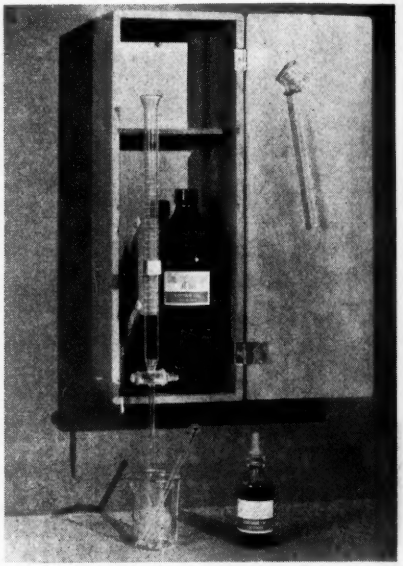
Adaptation of formulae to the individual requirements of busy war contractors.

Within specification limits there are many possibilities of improvement in speed, workability, and freedom from rejects.

This PLUS factor is worth considering. We'd like to tell you more about it.

The Varnish Products Co.
Cleveland, Ohio

from the work and additions of cleaner become necessary to maintain operating efficiency. The use of the sets described here is said to make possible the control



Kocour Analytical Set

of solution with a minimum effort. Readings obtained from the sets are those sought; no involved calculations are required.

The set pictured here consists of a cabinet fitted with hardware to hold the necessary glassware during use and storage. The solutions are in easily handled bottles, well labeled. The sets are made in the following types: Set U

WE RECOVER YOUR SOLVENTS and THINNERS
from Sludge, Waste, Wash, Spoiled Lacquers, etc.
AND SAVE YOU MONEY
Each shipment—one drum or a carload—receives PROPER and SEPARATE TREATMENT.
Solvents recovered by the Lofgren Process.
Write to:
SOLVENTS RECOVERY SERVICE, Inc.
1019 BROAD ST. NEWARK, N. J.
or
HAMMOND CHEMICAL SERVICE, Inc.
241 BRUNSWICK ST. HAMMOND, IND.

NEW ORBITAL MULTI-DIRECTIONAL SANDING PRINCIPLE GIVES BETTER RESULTS IN

FINISHING
LAPPING
POLISHING
RUBBING
SANDING

New Orbital Principle

As shown above, with the Sterling 1000, each grain cuts a microscopic furrow 3/16" in diameter. The furrows cross and re-cross each other, cut at the rate of 4500 per minute, each at the same speed and at the same time, achieving a degree of uniformity and smoothness never possible with conventional uni-directional sanding methods.

USE THE STERLING 1000

FOR THE SMOOTHEST, CLEANEST, MOST UNIFORM SURFACE

In contrast to conventional uni-directional sanding methods, the NEW multi-directional, or orbital, principle employed by the STERLING 1000 provides a versatility and a degree of surface smoothness never before possible to achieve, by mechanical means, on wood, metal, plastics, plywood, stone and other materials. It will pay you to get full particulars *now* as to how the Sterling 1000, operating on an entirely new principle, will cut costs and speed production in your plant.

STERLING TOOL PRODUCTS COMPANY

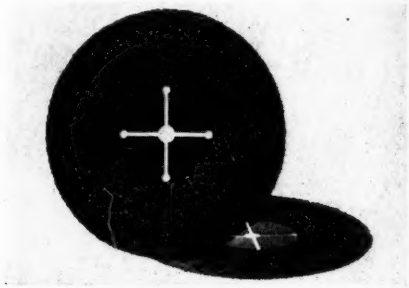
375 E. Ohio Street, Chicago 11, Illinois

615 W. Washington Blvd., Los Angeles, Calif. 74 Wellington Street, W., Toronto, Canada

for alkaline cleaners; Set V for acid pickles; Set W for iron in acid pickles; Set VW for acid pickles and iron in same; Set UV for cleaners and acid pickles, and Set UVW for cleaners, pickles and iron.

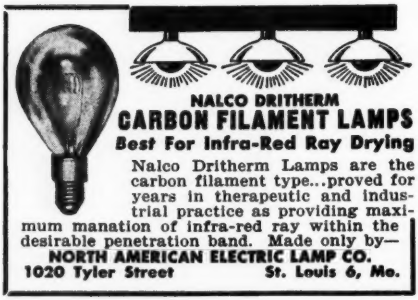
"Marvel" Abrasive Sanding Discs

A line of "Marvel" abrasive sanding discs made of aluminum oxide grit, firmly bonded with a special heat-resisting resin to a chemically treated, super-pliable, genuine fibre back, has been developed by Fibre Abrasive Corporation, 1129 E. 74th St., Chicago, Ill. A resin bond will not soften under high speed frictional heat and, according to the manufacturer, Marvel discs are extremely hard and tough, and require minimum cleaning and replacement.



"Marvel" Abrasive Sanding Discs

Designed for high speed continuous work, the discs are available in diameters ranging from 6 to 30 in. and in all grit numbers.


NALCO DRITHERM
CARBON FILAMENT LAMPS
Best For Infra-Red Ray Drying
Nalco Dritherm Lamps are the carbon filament type...proved for years in therapeutic and industrial practice as providing maximum manation of infra-red ray within the desirable penetration band. Made only by—
NORTH AMERICAN ELECTRIC LAMP CO.
1020 Tyler Street St. Louis 6, Mo.

PUT THESE OPERATIONS INTO THE PRODUCTION LINE--

PREPARATION
Precleaning · Washing
Degreasing · Pickling
Rust Removal
Burnishing

PROTECTION
Rust Protection
Bonderizing
Parkerizing

FINISHING
Painting · Baking
Plating · Drying
Cooling

There's no need for interrupting smooth, speedy mass production of metal objects with slow, intermittent manual operations for preparation, protection and finishing.

MAGNUS
METHODS - MATERIALS - MACHINES

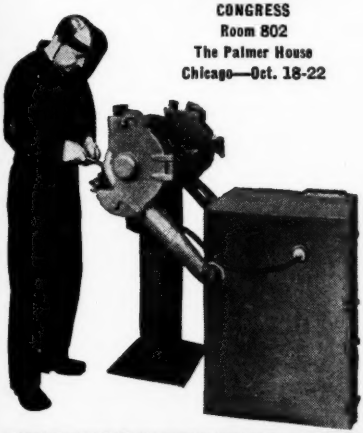
designed to fit your particular requirements will insure better quality and faster, more economical production. Let us show you what we can do to put these operations on a modern, completely automatic basis.

WRITE FOR YOUR COPY OF THE METAL CLEANING HANDBOOK

MAGNUS CHEMICAL COMPANY
208 South Avenue Garwood, N. J.
Service Representatives in principal cities

It's No Trick At All With TORIT

See our exhibit at the
NATIONAL METAL
CONGRESS
Room 802
The Palmer House
Chicago—Oct. 18-22



PORTABLE, SELF-CONTAINED TORIT DUST COLLECTORS

TORIT DUST COLLECTORS will solve your dust problems. Portable, and completely self-contained they fit into your present production layout and, when necessary, can be moved to meet changing conditions.

You can reduce absenteeism and maintain employees' health . . . prevent excessive wear on valuable and irreplaceable machinery . . . by trapping abrasive dust particles at their source with TORIT Dust Collectors. For complete information write:

TORIT MANUFACTURING CO.
314 Walnut St. St. Paul, Minn.

TORIT Dust Collectors
SELF-CONTAINED UNITS

McKEON'S

"Liquid Sulphur"

REMOVES COPPER.

•

Sample and cooperation FREE

•

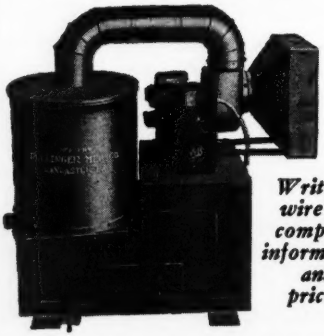
SULPHUR PRODUCTS CO.

GREENSBURG PA.

KREIDER

Centrifugal Dryer

Gear your plant to faster production with this high-speed dryer. It speeds drying, cuts drying cost, and is easily operated by one worker. V-belt drive, ¾ H.P. motor, foot brake and reversing drum switch. Auxiliary heating unit available.



Write or wire for complete information and prices.

DELLINGER MFG. CO., 729 N. Prince St., Lancaster, Pa.

Heat-Resistant Mitt

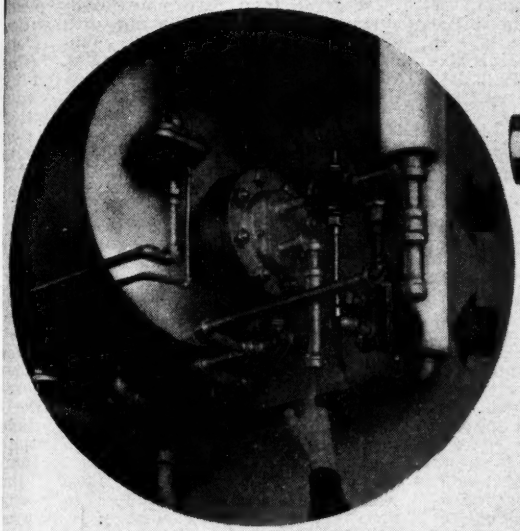
Due to the shortage of asbestos cloth used in the manufacture of asbestos gloves and mittens for industrial purposes, there is a need for efficient hand protection as a substitute. The jumbo size all-leather wool-lined one-fingered

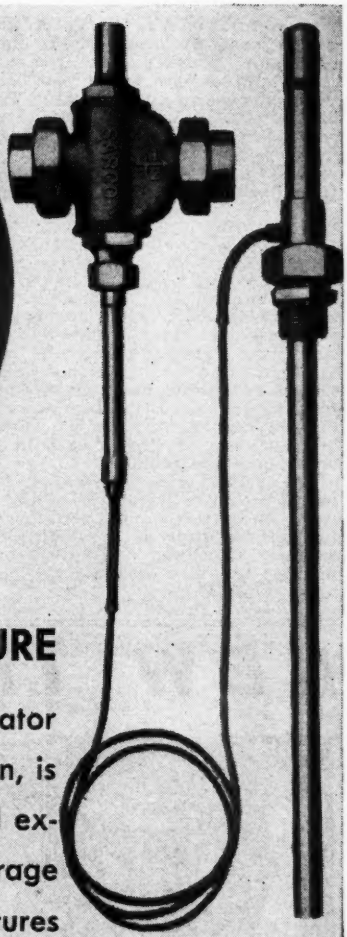
Heat-Resistant Mitt No. 14730

mitt recently designed by Industrial Gloves Company, 746 Garfield Blvd., Danville, Ill., to meet this requirement.

Made of heat-resistant leathers, the one-fingered mitt pattern assures adequate ventilation and coolness to the operator; easy "on-and-off" in a jiffy for safety in handling of extra hot materials. It is made with 4-in. gauntlet with extra protection at the wrist; the thumb is reinforced with a leather strap. The mitt may also be had with 2-in. band and 6-in. gauntlet if desired.

"Dust Collecting in Industry" is the title of a folder now being issued by Peters-Dalton, Inc., 630 E. Forest Ave., Detroit 1, Mich. The folder describes a number of the Hydro-Whirl dust collectors made by this firm, including a new orifice type dust collector especially suited for processing magnesium. The folder is well illustrated with photographs of individual units and plant installations. Copy free upon request.





CONTROLS HOT WATER TEMPERATURE

The Sarco TR-21 temperature regulator is self-actuated by liquid expansion, is packless and easy to install. Used extensively for steam heated storage tanks and process work. Temperatures 0° to 400° F., pressures to 175 lbs. Ask for Catalog No. 600.

Sarco TR-21 Temperature Regulator

SARCO SAVES STEAM

SARCO COMPANY, INC.
475 Fifth Avenue, New York 17, N. Y.
SARCO CANADA, LTD., 85 Richmond St. W., TORONTO, ONT.
171

Cleaning Up War Parts. A group of actual case histories which show the part Sun Spirits play in cleaning war parts is given in a folder now being distributed by Sun Oil Company, Philadelphia, Pa. Sun Spirits is an all-purpose solvent which has a variety of uses from metal cleaning to the thinning of paints, varnishes and enamels. Copy of this interesting folder free upon request.

Brightboy Products. Brightboy Industrial Division, Weldon Roberts Rubber Co., Newark 7, N. J., has announced the publication of a comprehensive catalog on Brightboy rubber cushioned abrasive products. Many time and production short cuts in de-burring, finishing and polishing are described and illustrated. A table of machine speeds covering the use of Brightboy wheels, and descriptions of wheels, rods, sticks, tablets and special shapes used in manual operations are included.

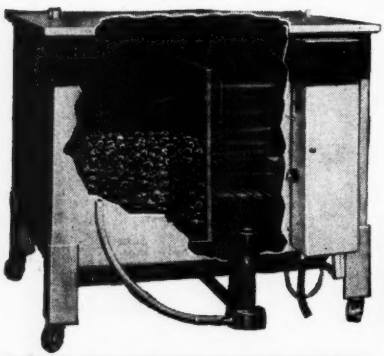
The scope and purpose of the two newer Brightboy textures—Fine-Tex for work on softer metals and for producing special finishes, and Tuff-Tex for rougher finishing and work on hard metals—are also described. Copy free upon request.

Clean Surfaces. Are chemically clean surfaces essential? Plating authorities and shop practice have conclusively proved that successful plating and finishing operations must be preceded by thorough degreasing of the basis metal. Of timely interest to war production metal-working plants in this connection is a 16-page booklet issued by Oakite Products, Inc., describing the use of a newly developed material—Oakite Composition No. 90 for the anodic degreasing of steel and cooper.

Free copies of this data-filled booklet are available upon request. Write to Oakite Products, Inc., 20 Thames St., New York 6, N. Y.

Blaxite. A portfolio of procedure for the black oxidation of steel surfaces with the Blaxite process has been prepared by The Tobler Chemical Co., Portland, Conn. Topics discussed include tank arrangement and construction, heating and control provisions, preliminary conditioning and handling of the work, preparation of tanks, processing directions, one-bath processing, and processing suggestions. To obtain a copy of the portfolio without charge, address a request on your business letterhead.

NEW Improved Vapor Degreasing



Speeds Up Vapor Degreasing by More Than 33⅓% -- Safer, More Economical

Developed by Phillips, PHILLSOLV vapor degreasing solvent is tops for efficiency. It cuts vapor degreasing time by one third! Reduces vapor loss. Handles wider range of greases. Gives more thorough penetration of close, nested parts of ferrous and non-ferrous metals. Low toxicity—higher safety factor.

Complete Line of Electrical
VAPOR DEGREASING MACHINES
A machine for every type of job. Portable—can be moved to the job. Require no gas, water or steam lines. Many other features. Write for catalog.

Write for FREE Degreasing Manual!
PHILLSOLV, non-water soluble, has many applications in instrument and war plants. No corrosive action. Write today for FREE manual on Vapor Degreasing telling how to use this new process. Also for catalog of Phillips Electrical Vapor Degreasing machines.

PHILLIPS Manufacturing Company • 3456 W. Touhy Ave., CHICAGO, ILLINOIS

AS YOU NEVER DROVE BEFORE!

Many a soldier owes his life to a commander who *never let him slacken for a single fatal instant!* And after the war, many a worker will owe his economic safety to a leader who drove him continuously for higher Pay-Roll allotments.

Despite higher taxes and prices, the average worker still has more money than ever before—particularly on the basis of the *family* income. With others in the family earning, too, just let the worker 'figure it out for himself!'

That's why the Treasury Department has set new quotas for the current Pay-Roll Allotment Drive designed to reach *new* money that's coming into the family income. Coming from millions of new workers . . . from women who never worked . . . from millions who never before earned anything like what they are getting today!

The current War Bond effort is built around the *family* unit, and we now urge you to organize your War Bond *thinking* on the basis of *family* incomes. For details, get in touch with your local War Finance Committee which will supply you with all material for the presentation of the new plan to your workers through your labor-management committees. Get this new *family income plan working now!*

This space is a contribution to America's all-out war effort by

PRODUCTS FINISHING

Despatch CF Furnaces, arranged with gas or electric heating systems and for temperatures up to 1250 deg. F., are the subject of Bulletin 83 which has been prepared by Despatch Oven Company, Minneapolis, Minn. The furnaces are used for tempering and drawing, solution heat treating, annealing glassware, metallurgical testing, and so on. Copy free upon request.

Electric Instruments. A General Electric publication, "Electric Instruments, Principles of Operation," presents a concise discussion of the characteristics of instruments, what makes them operate, and the individual limitations of the various types. Designated GET-1173, it is available on request to the company at Schenectady, New York.

The introduction to the publication points out that the use of electricity in manufacturing processes has become so general that the important question of whether it is being used in the most economical way is sometimes overlooked. Electric instruments are defined simply as tools for obtaining essential information about electric circuits. Thus, a study of their construction and application invariably points the way to lower costs and improved manufacturing methods, according to the publication.

Lima Electric Motors, gearshift drives, pedestal grinders, magnetic polishing lathes, special rotors and stators are described and illustrated in a bulletin available free upon request from The Lima Electric Motor Company, Lima, O.

For a real good polishing job use

KEYSTONE EMERY

TURKISH — NAXOS — AMERICAN

KEYSTONE EMERY MILLS *Write for Sample* 4316 Paul St., Phila., Pa.

BEAVER
BARREL FINISHING RESEARCH

The only Internationally recognized Barrel Finishing Research organization in existence whose sole effort over a period of thirty-two years has been the development of methods and materials for mass production effort in barrels.

H. LEROY BEAVER
LANSDALE, PA., U. S. A.